

New Mexico Tribal Coalition Rural Systemic Initiative Midpoint Evaluation Report

July 1, 2001 to June 30, 2004

**Prepared for:
NM Tribal Coalition**



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Executive Summary

The New Mexico Tribal Coalition (NMTC), a program of the Santa Fe Indian School (SFIS), aims to “assure a standards-based, inquiry-centered K-12 mathematics and science education system that supports all learners in attaining success in vigorous, high-quality mathematics and science”. The NMTC Midpoint Evaluation Report contains both a formative evaluation and an outcomes evaluation, including longitudinal data from primary and secondary sources. The formative evaluation of this report is modeled after the National Science Foundation (NSF) *User-Friendly Handbook for Project Evaluation*, while the outcomes evaluation is based on the Drivers of Systemic Reform as defined by the NSF.

The 12 NMTC schools differ greatly in their size and are located throughout northern New Mexico. SFIS is unique among the schools as it serves students in grades 7-12 and has an application process for admission. Another critical organization with a close relationship to NMTC is the Coalition of Educators for Native American Children (CENAC), an alliance of the 12 NMTC’s schools and their principals formed in 1997 that is closely intertwined with NMTC.

During 2003-04, the total enrollment in NMTC schools was 2,355 students at 12 schools. NMTC served 199 teachers and 139 taught mathematics and/or science in 2003-04. During that same year schools were classified into Full Involvement (5 schools) and Partial Involvement (7 schools) by criterion established by NMTC personnel. The number of students enrolled in NMTC has not fluctuated by more than 15% for any grade level group including K-3, 4-8 and 9-12 from 1996-97 to 2003-04.

Formative Evaluation

NMTC management is housed at the SFIS, yet depends on the system of collaboration and shared governance present in CENAC. Monthly CENAC meetings are utilized as a forum for NMTC and CENAC participants to disseminate information, address concerns, and introduce new policies. Seven NMTC staff members have been hired and trained; the majority of these staff members are Native American with ties to the NMTC schools. Financial resources are used to research, develop, implement and support programs in which students, teachers, administrators, and Math, Science and Technology Leaders (MST Leaders) from the 12 schools are involved.

The activities carried out by NMTC, such as extensive professional development and activities like COOL, a program developed to cultivate Native American school leaders, reflect the goals of maximizing resources and addressing common problems. Despite adjustments to plans and activities due to unanticipated needs of communities or external circumstances, NMTC remained focused on their overall reform goals. While most timelines have been met, the NMTC utilizes CENAC monthly meetings and Strategic Planning meetings to increase accountability and capacity in meeting timelines. Two of NMTC’s goals that are not proceeding as well as other goals include implementing the MST Leaders program at all schools (3 schools still lack of MST Leaders) and the development of specific strategies for resource convergence with the BIA Center for School Reform.

Outcomes Evaluation

Standards Based Curriculum (Driver 1)

In 2003-04, there were 16 MST school leaders at 9 schools, though 2 (both from SFIS) were minimally involved. NMTC provided or facilitated professional development for those 16 MST Leaders as well as 171 teachers in 2003-04. In comparison to Years 1 and 2, NMTC provided professional development to a larger

number of MST Leaders Year 3. However, the number of hours of professional development which both MST Leaders and teachers participated in fell notably from 2002-03 to 2003-04. This is likely a result of challenges with data collection and recording, a persistent problem for the NMTC, which was exacerbated in 2003-04 by a large amount of trainings being held at individual schools.

Importantly, teachers' self-reported comfort levels teaching both mathematics and science content are improving. A sample of NMTC teachers indicated greater comfort teaching mathematics content in 2004 than in 2002 and 1999 and science content in 2004 than in 2002. More than 50% of another sample of NMTC teachers reported feeling "adequately" or "very well" qualified to teach 13 out of 16 mathematics topics and 22 out of 23 science topics.

Each year teachers, administrators, and support staff participate in centralized professional development trainings, called CENAC Rallies. The 2002 School Reform Rally, "Understanding Students and Utilizing Native Culture" had 450 attendees while "Leaders for a Culture of Change" in 2003 had 427 participants. Additionally, more than 350 students in grades K-8 participated in the 2004 NMTC-wide Science Fair, another event which brings together student and teachers from across NMTC schools.

Policy Changes (Driver 2)

NMTC administrators participated in a greater number of hours of professional development in Year 3 than during Years 1 and 2. CENAC monthly meetings, Governance meetings, and the NMTC Strategic Planning meeting provided forums for policy discussions and collaborations towards reforms among administrators and other key players. Additionally, the Cultivating Our Own to Lead (COOL) program certified 25 Native teachers as administrators.

Resource Convergence (Driver 3)

A notable event relating to Resource Convergence occurring during Year 3 when NMTC's decided to end the Partners Council due to a lack of commitment, content and implementation. During the same year, another collaboration was implemented, the NM Partnership for Mathematics, which provided NMTC with a public school partner that is successfully using MathLand to mentor 2 schools in the use of inquiry-based approaches.

Partnerships (Driver 4)

The Annenberg Circles of Wisdom (a program NMTC has historically worked closely with)'s five years of funding ended in 2002, but many of the associated programs have been maintained through NMTC. The Native American Math Education (NAME) Games invited teachers, students, and parents to participate in problem solving, probability, and critical thinking games. Additionally, the Technology Group Committee, comprised of representatives from NMTC schools and formed in 2002, continued efforts to improve communication and cooperation regarding the use of technology through a grant received with the assistance of NMTC.

Student Achievement (Driver 5)

The percent of students proficient in mathematics in grades 3-7 rose from 2002 to 2004 for all grades except grade 6 which fell by one percentage point. Proficiency levels in mathematics at 5 of the 9 larger schools rose for grades 3 and 5 from 2002 to 2004. At 3 of the 7 schools large enough for a comparison, female students were doing as well or better than male students in percent proficient in mathematics in 2004. The percent of students proficient in science in grades 3-7 rose or remained level from 2002 to 2004 for 2 grades and fell for 2 grades. During the same period, proficiency levels in science at 5 of the 9 larger schools rose or remained constant for grades 3 and 5 from 2003 to 2004. At 4 of the 7 schools large enough for a

comparison, female students were doing as well or better than male students in percent proficient in science in 2004.

Eliminating Achievement Gaps (Driver 6)

The percent of NMTC students' proficient in mathematics was lower than Native students nearby, all students nearby and students statewide from 2002 to 2004. While the gap in mathematics proficiency between NMTC students and Native students remained relatively level (1 percentage point difference), the gap in science proficiency grew by 6 percentage points.

When schools were classified by level of involvement with the NMTC approach by the Evaluation Team, mixed results in test score improvement across groups were revealed. Some schools with high Involvement with the NMTC may not be performing as well as schools with low Involvement due to partial implementation of reform at schools. Additionally, factors that have not been captured in the measured utilized by the Evaluation Team may be impacting student test scores and schools' involvement.

Conclusions/Recommendations

NMTC's relationship with CENAC schools has led to a strong collaboration. These partnerships allow for policy concerns and mutual problems to be addressed often and holistically. NMTC principals and teachers who participated in questionnaires and interviews are pleased and supportive regarding NMTC's success in impacting students, teachers, and the community. As the NMTC enters its final year of funding, the Evaluation Team recommends that NMTC (1) revisit program goals (2) address sustainability of selected program components (3) clean and update the NMTC database (4) target subgroups of teachers with professional development (5) focus on including Native Ways in mathematics (6) place equal emphasis on mathematics and science success and (7) help schools change their outlook on standardized exams.

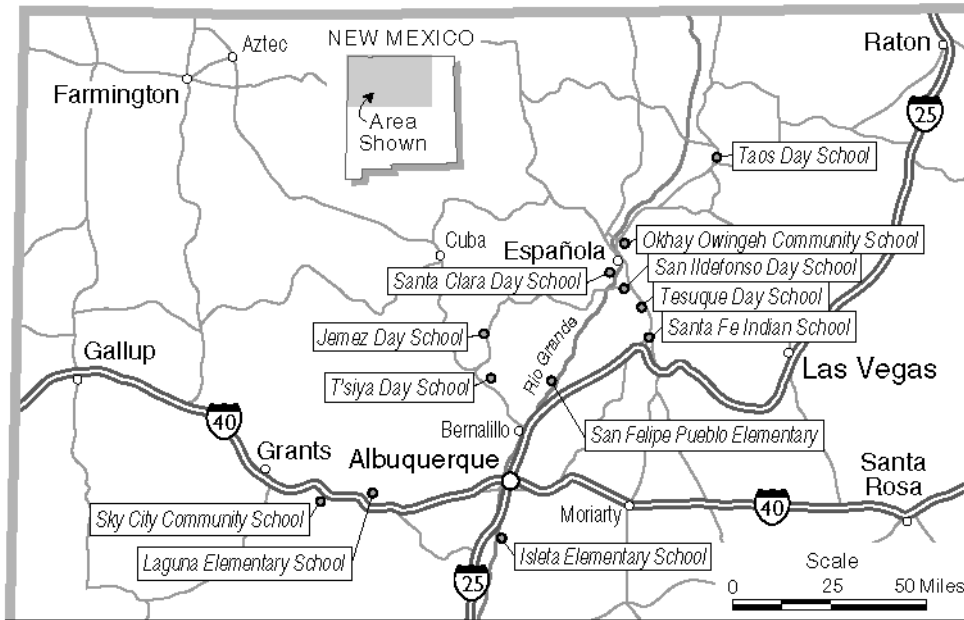
Introduction

The New Mexico Tribal Coalition's Rural Systemic Initiative (NMTC-RSI) is a program of the Santa Fe Indian School (SFIS) that works with 12 Bureau of Indian Affairs (BIA) schools serving Pueblo students. NMTC's goal is to "maximize resources and address common problems" in order to assure a "standards-based, inquiry-centered, K-12 mathematics and science education system that supports all learners in attaining success in vigorous, high-quality mathematics and science" through partnerships and relations between all 12 schools. NMTC places unique emphases on the integration of mathematics and science curriculum with Native ways of knowing. The NMTC has and will continue to be funded by the National Science Foundation (NSF) for the period from July 1, 2001 to June 30, 2006. Debra Scruggs serves as the Principal Investigator (P.I.) of the NMTC and Dr. Anya Dozier Enos and Viola Archuleta are the Co-Principal Investigators/Project Directors. NMTC was one of the four original coalitions within the UCAN-RSI. The UCAN-RSI was funded for a five-year period from September 1995 through August 2000. At the completion of the UCAN-RSI contract, the NMTC remained a united and cooperative entity and subsequently applied for and received funding from the NSF. NMTC works with the Coalition of Educators for Native American Children (CENAC), which was formed in 1997 with encouragement from UCAN-RSI.

This report includes a brief formative evaluation, modeled after the NSF *User-Friendly Handbook for Project Evaluation*, as well as a more in-depth outcomes evaluation, based upon the Drivers of Systemic Reform as defined by NSF. The report contains both qualitative and quantitative data from multiple sources, with triangulation of findings conducted whenever possible. To capture a comprehensive picture of program outcomes, a variety of measures and results were examined. Supporting data were collected from both secondary and primary sources through surveys, interviews, correspondences, test data files, examination of event evaluations, and reports and program document review.

Background

Figure 1
Map of NMTC Schools



The 12 NMTC schools are located throughout northern New Mexico; half of the schools are within the Southern Pueblo Agency jurisdiction while the other half are in the Northern Pueblo Agency. During the 2003-04 academic year, the schools' enrollment ranged from 19 to 549 students. It is important to note that BIA schools do not belong to "districts", rather they operate as independent entities. The BIA agencies' function is administration and budget management oversight, not school policy-making or school governance.

Santa Fe Indian School

NMTC is a program of SFIS, which is a unique school among the NMTC schools in that it serves students in grades 7-12 while the other schools serve mostly elementary student in K-5, K-6, and K-8 Schools. SFIS is also distinguished from the other schools in that it provides an education to students from various tribes and requires an application process for admission.

SFIS was founded in 1890 as a federal boarding school with the purpose of culturally assimilating Indian children through education and isolation from their families. In 1962, the SFIS's Santa Fe site was taken over by the Institute of American Indian Arts and SFIS merged with the Albuquerque Indian School. Beginning in the mid-1970's, a series of events led to the Albuquerque Indian School being transferred to the SFIS and the Institute of American Indian Arts being permanently relocated to a neighboring site in Santa Fe. In 1975, as a result of the passage of the Indian Self-Determination Act, administration of the school transferred from the U.S. Government to the American Indian Pueblo Council. The school has since evolved into a community school with the mission of fostering traditional Indian culture, while teaching the skills necessary for students to thrive as individuals.

History and Role of CENAC

CENAC was created in part by the NMTC in 1997 with encouragement from UCAN-RSI. The school principals formed an alliance of the NMTC schools and projects focused on student achievement. An important and unique aspect of CENAC is its shared governance. Members of CENAC meet once a month, collaborating toward continued and increased success of Native students. Monthly meetings rotate from school to school, with the principal of the meeting site being responsible for leading the meetings. This governance style has been created as a result of Pueblo concepts of shared leadership and decision making and is a fundamental aspect of CENAC.

CENAC as an entity does not have authority over any of the schools, but policies within NMTC schools are influenced by the fact that principals are the educational leaders of their schools. Principals, as school leaders, along with school boards, influence school level policy decisions. For example, as a result of CENAC's advocating, all schools have adopted the New Mexico State Content Standards and most have selected a standards-based mathematics curriculum. CENAC strives to create an environment that fosters respect, trust and connection among the schools and their staff. As an organization and a policy vehicle, CENAC is uniquely intertwined with many aspects of the NMTC, given the two organizations reciprocal influences on one another.

Goals and Objectives

NMTC's primary, overarching goal is to increase student achievement in mathematics and science. In order to achieve this ultimate goal, the following related objectives were established by NMTC in their proposal to the NSF. These goals and objectives will be evaluated throughout this report in order to measure the meeting of the goals as well as any evolution of goals and objectives:

1. Using Data to Improve Student Learning in Classrooms
 - a. Establish technical assistance in the alignment of school based professional development plans with goals and priorities with continued focus on assessment
 - b. Collaborate with the University of New Mexico (UNM), Los Alamos National Laboratory (LANL) and others to assure full implementation of standards based curriculum and assessment in every classroom based on results on the Implementation Matrix Measuring Progress in Reform
2. Teacher Quality Gap (Bridging Teacher Preparation with Effective Classroom Teaching)
 - a. Develop professional development that is grounded in field tested environments that are reflective of rural communities and schools
 - b. Focus on recruitment, induction and retention of quality teachers for CENAC schools
 - c. Strengthen preservice programs by improving communication between colleges of education and CENAC Schools (for example, use preservice interns in classrooms to observe levels of classroom implementation of standards based curriculum and assessments)
 - d. Share information with cooperating colleges of education
3. Research in Systemic Reform
 - a. Continue support of ongoing research in the identification of strategies that work with Native American youth and continue to disseminate information
4. Resource Convergence
 - a. Develop specific strategies with the national BIA School Reform Center
 - b. Focus with Partners Council on alignment of resources with the CENAC schools
 - c. Disseminate information on successful strategies and develop a means for school based leadership teams to share lessons learned
5. Leadership and Professional Development through Partnerships

- a. Support individuals from each school to participate in opportunities including WestEd Leadership Academy, Families Achieving New Standards in Math, Science, and Technology Education (FANS), and LASER and to provide training within their local areas
6. Capacity Building in Standards Based Curriculum and Assessment, policy strategies and other areas identified
 - a. Continue ongoing professional development for MST (Math, Science, and Technology) School Leaders through the Summer Leadership Institutes to meet specific needs of each school
 - b. Enhance focus on how to lead reform at the local level through MST Leaders
7. Building Broad Bases Support and Dissemination
 - a. Implement the RSI's outreach plan and those activities identified to disseminate best practices including pilot sites for community involvement through Math and Parent Partnerships in the Southwest (MAPPS)
 - b. Seek other funding sources to expand NMTC's involvement in community outreach
8. Special Initiatives
 - a. Collaborate with the Community Based Education Model (CBEM) program at SFIS and Circles of Wisdom to provide professional development in a variety of ways

Chapter 1: Formative Evaluation

The NMTC Evaluation Team collects and evaluates formative data to assist the NMTC leadership team in identifying organizational and structural areas of progress and existing or potential barriers to progress.

This chapter utilizes qualitative evidence such as meeting minutes, communications/correspondence and peer evaluation of NMTC effectiveness. Whenever possible, comments collected from interviews are included.

This chapter is organized into five sections, modeled after the key formative evaluation questions presented in the *NSF User-Friendly Handbook for Project Evaluation* (1998:7)

1. Was a management plan developed and followed?
2. Were the appropriate staff members hired, and trained, and are they working in accordance with the proposed plan? Were the appropriate materials and equipment obtained?
3. Were the appropriate participants selected and involved in the planned activities?
4. Do the activities and strategies match those described in the plan? If not, are the changes in activities justified and described?
5. Were activities conducted according to the proposed timeline? By appropriate personnel?

Section 1: Was a management plan developed and followed?

The management of NMTC, though housed at SFIS, is in many ways a system of collaboration and shared governance, which recognizes and places emphasis upon the necessity of its relationship and partnerships with the schools it services. While NMTC remains a separate entity, many of its initiatives are shared with CENAC, hence the two organizations' functioning are uniquely intertwined. As previously described, CENAC leadership is shared by the NMTC schools. Given that CENAC governance is a unique communal system, NMTC's governance is therefore unique from many programs in that it is more decentralized and collective.

It is important to note that CENAC was pre-existent to NSF funding for NMTC and in many ways was a source of guidance and direction in the development. Therefore, NMTC draws many organizational goals and directives from CENAC. Hence, a new, independent management plan was not initiated as a plan already existed which NMTC was able to integrate into its own functioning.

The NMTC management plan, as an offspring of CENAC, is based on utilizing CENAC as a forum for raising policy concerns and creating solutions to shared problems within the schools. CENAC meetings are held monthly at alternating schools (whose principal is responsible for meeting management). At these meetings NMTC and CENAC personnel collaborate to disseminate information, address concerns, and introduce new policies. This constant interaction between NMTC management and those it services creates a foundation of strong management as well as a constant forum for change and discussion.

Section 2: Were the appropriate staff members hired, and trained, and are they working in accordance with the proposed plan? Were the appropriate materials and equipment obtained?

The NMTC has hired and trained 7 staff members for the positions of Principal Investigator, co-Principal Investigator and Project Director, Cultivating Our Own to Lead (COOL) Project Director, Administrative Assistance, Research Intern, and Project Director for the CENAC Enhancing Education Through Technology grant. The NMTC staff are for the most part from New Mexico Pueblos. The hiring of a large number of people of Pueblo descent is important given NMTC's emphasis on Pueblo students. Many of the NMTC staff have gone to school, lived and worked in New Mexico and at the Pueblos and schools involved in NMTC. Hence, the

staff members are invested in their work and have first-hand knowledge of the student population the NMTC program strives to impact. Moreover, 6 of the 7 employees previously worked at or attended one of the NMTC schools (5 of those 6 have ties to SFIS).

Much of the work NMTC is involved in does not require expensive materials and equipment, rather it requires supportive materials that aid student learning and policy reform. Financial resources are utilized to research, develop, and implement programs.

CENAC has been working towards the implementation of standards based curriculum/curricular materials in each of its schools. Figure 2 presents the adoption of both mathematics and science standards based curriculum/curricular materials by school and year adopted.

Figure 2
Mathematics and Science Standards Based Curriculum/Curricular Materials
By School and Year Adopted

School	Mathematics Materials	Adopted	Science Materials	Adopted
Isleta	Harcourt Brace	2000-2001	Discovery Works	1999-2000
Jemez	Everyday Math	2003-2004	Mixed	N/A
Laguna	MathLand	2000-2001	Scholastic Science	1999-2000
San Felipe	Scot Foresman/ Investigations	2000-2001	Scholastic Science	1999-2000
Sky City	MathLand/MathScape	2000-2001	Scholastic Science	1999-2000
T'siya	Everyday Math/Glencoe	2000-2001	Discovery Works/ STC Kits	2000-2001
SFIS	None	2000-2001	Mixed – CBEM, teacher created	N/A
OOCS	MathLand/MathScape	2000-2001	Mixed	N/A
San I	Everyday Math	2000-2001	Mixed	N/A
Santa Clara	Everyday Math	2000-2001	FOSS kits, Discovery Works	1999-2000
Taos	Scot Foresman	2003-2004	STC, BSCS, Project WET	N/A
Te Tsu Geh	Everyday Math	2000-2001	Mixed (STC Kits, Teacher-made)	N/A

*Table Taken from NMTC Year Annual Report

For Mathematics, 5 schools adopted Everyday Math, 2 adopted Scot Foresman, 3 adopted Mathland or Mathland/MathScape and 1 adopted Harcourt Brace. As of 2003-04, SFIS had not adopted standards based curriculum/curricular materials. For Science, 3 schools adopted Scholastic Science, 2 adopted Discovery Works, and 6 used mixed materials. However, teacher interviews reveal that classroom level usage of these standards based materials varies greatly.

Section 3: Were the appropriate participants selected and involved in the planned activities?

All NMTC activities are implemented to directly or indirectly impact student success in science and mathematics through the support of high-quality education. Participants in each initiative vary depending upon the nature of the activity and its desired impact. These projects and their associated participants are outlined according to NMTC goals and strategies below:

Kimball Sekaquaptewa, the Project Director for the CENAC Enhancing Education Through Technology grant, has been working in association with NMTC school principals and Kirk Minnick of Minnick & Associates, Inc. to gather and disseminate data on student attainment. The NMTC stated in its Proposal that it intends to establish technical assistance in the alignment of school based professional development plans with goals and priorities. NMTC has a database of teachers, administrators, and staffs professional development hours and content area by year which is utilized to track participation in professional development. However, problems with inconsistent and limited data collection have existed across all program years. These problems appear to be worse in Year 3 as a result of professional development being more often based at individual schools rather than program-wide compared to previous years.

The NMTC also aimed to collaborate with UNM, LANL, and others to implement standards based curriculum and assessment in every classroom based on results on the Implementation Matrix Measuring Progress in Reform. At the program midpoint, this had not yet happened. As NMTC continues to solidify connections and deepen relationships with UNM, LANL, and other potential collaborators, this goal should will become more obtainable.

NMTC has initiated the involvement of the schools its serves in professional development for teachers, administrators and staff in instructional strategies in mathematics, science, and technology; science, mathematics and technology content; research strategies; and leadership development. Teachers have participated in professional development sessions in a variety of geographical locations with many sessions in 2003-04 held at individual schools. NMTC has developed professional development that is grounded in field tested environments reflective of rural communities and schools by utilizing Dr. Shelly Valdez of Laguna Pueblo and other consultants to develop pertinent professional development through the CENAC Science Fair and Native Applied Brain Science (NABS). These two activities aim to focus on having the community set the direction for student learning and on honoring Native ways of learning. Teacher interviews reveal that there is a large gap in the level of application of Native ways in science (high) and math (low) at NMTC schools. NMTC also has included a workshop on Community Based Education in each CENAC Rally. Lastly, NMTC communicates at least once a year with the Alaska RSI to keep current on methods geared at rural schools and communities, which Alaska is utilizing in its professional development.

NMTC also aims to focus on recruitment, induction and retention of quality teachers for CENAC schools. There do not appear to be any specific methods utilized by NMTC across all schools to increase the recruitment and induction of quality teachers for CENAC schools, however some schools may be achieving this goal individually. The retention of quality teachers has been addressed in a number of ways by NMTC. Cultivating Our Own to Lead (COOL) interns are allowed flexible work hours and teacher training experiences. Teachers who are interested in leadership positions throughout NMTC are encouraged to participate in the COOL program, which trains teacher to become school leaders. NMTC encourages teachers to participate in the BIA's Grow Your Own program, which helps staff pay tuition. Individual schools may be addressing the issues of retention on their own; for example, at SFIS all staff members are offered the opportunity to become certified. SFIS pays for teachers' tuition in return for the teachers' commitment to remain at SFIS for a time equal to their enrollment.

Strengthening preservice programs by improving communication between colleges of education and CENAC schools is another goal of NMTC. COOL interns and MST Leaders provide one link between CENAC and colleges of education through their involvement in coursework and other related professional. The COOL program's coursework is completed at New Mexico Highlands University. Dr. Joseph Suina (Cochiti) of the Institution of Indian Education at the University of New Mexico attended the March 2004 CENAC meeting to communicate with CENAC leadership; he later met with the co-PI and has included NMTC schools in his recruitment of students for teacher and administrator training. NMTC has been less involved with the College of Santa Fe whose tuition costs are significantly higher than the state's public institutions. Isabelle Sandoval acted as a liaison between NMTC and the College of Santa Fe prior to the cancellation of the Partner's Council (discussed later in this section and in further depth in Chapter 3); and though communication continued following the cancellation of the Partner's Council, costs appear to prohibit many NMTC teachers from involvement with the College of Santa Fe. NMTC has also recently initiated a relationship with Northern New Mexico Community college, which began offering a bachelor's degree in education in Fall of 2004.

Information has been shared with cooperating colleges of education through the above relationships as well as through two additional contacts at UNM. A former Partner's Council member from UNM is helping NMTC teachers taking math courses to get education credit, while another UNM representative has provided professional development for NMTC teachers in community based science.

NMTC aspires to partake in and support research in the identification of strategies that work with Native American youth. Through CENAC, NMTC is able to share strategies and disseminate information on successes within the 12 schools. NMTC has also joined with the Community-Based Education Model (CBEM), one of NMTC's partner programs at the SFIS, to work towards implementing community-based education approaches to mathematics and science in the CENAC schools.

The major participants in Resource Convergence with NMTC include CENAC and the Partners Council, as well as individual schools and their leadership teams. NMTC also intended to develop specific strategies for resource convergence with the national BIA Center for School Improvement (formally the BIA School Reform Center). The BIA Center for School Improvement's former deputy director, Devin Skenandore, met with NMTC during the February 2004 CENAC meeting. The acting deputy director, Benjamin Atencio, and NMTC continue to communicate, but no specific strategies have been created.

The Partners Council was meant to include 10 representatives from Northern New Mexico Community College, the University of New Mexico, Los Alamos National Laboratory, New Mexico Highlands University, the College of Santa Fe, the BIA/Office of Indian Education Program's Division of School Improvement and Tesuque Pueblo's Environment Department. The Partners Council's intended role was to provide mentorship and guidance to NMTC administration. However, the Partners Council initiative has been ended by NMTC due to a lack of participation and positive outcomes. The decision to disband the Partners Council is furthered discussed in Chapter 3 of this document. Other NMTC partnerships include work with the Rural School and Community Trust's Native Sites, the Alaska RSI and WestEd.

NMTC endeavors to support individuals from each school's participation in opportunities including WestEd Leadership Academy, FANS, and LASER. This school-level involvement has not yet occurred consistently across NMTC and should be revisited as a program goal.

NMTC intended to select 2 MST School Leaders from each school, chosen based on recommendations from administrators and interviews with school staff. These selected individuals were meant to be open to change, have effective communication skills, experience, self-confidence, organization and the respect of their colleagues. NMTC has involved MST Leaders from many of the 12 schools in Summer Leadership Institutes

and additional leadership development activities. However, in 2003-04, 3 schools lacked participants in the MST Leader program and 4 schools had only 1 MST Leader.

NMTC proposal described plans to expand NMTC's involvement in community outreach by seeking other funding sources. The NMTC is a collaborator with the NPA/SPA technology grants, including the co-sponsored 2004 Rally. The project's co-PI has worked in collaboration with representatives from WestEd, the Alaska RSI, and the Native Sites Rural Trust to develop a proposal to help focus indigenous research in education; the proposal was returned by the Kellogg foundation and is currently pending funding from the NSF. If funded, the grant would bring together indigenous educators from around the world during NIEA and WIPCE to set a research agenda.

Section 4: Do the activities and strategies match those described in the plan? If not, are the changes in activities justified and described?

The activities and strategies utilized by NMTC most often agree with those described in the plan and when they differ from the plan, changes have been justified and described. One major setback in alignment with the NMTC proposal is the challenge in recruiting MST Leaders. NMTC aimed to have 2 MST Leaders per school, however the program was unable to obtain this number of MST Leaders. During Years 1 and 2, 4 schools did not have any MST Leaders. NMTC adjusted the MST Leader program to allow for additional MST Leaders at schools with high levels of interest. Hence, during Year 2, 2 schools had 4 MST Leaders. During the most recent program year (Year 3), the number of schools with no MST Leaders dropped to 3. NMTC recently adjusted its goal of having 2 MST Leaders per school as a result of the great difficulty in recruiting any MST Leaders from the smaller schools (2 have only 3 teachers). Another change in the intended activities was the recent elimination of the Partners Council due to a lack of involvement and participation among members. NMTC chose to end a partnership that was taking resources and not producing significant outcomes in order to put time and resources into more productive outlets. This change happened too recently for the NMTC to have produced a viable substitute for the Partners Council.

Section 5: Were activities conducted according to the proposed timeline? By appropriate personnel?

The activities necessary to achieve the goal of "developing a standards-based, inquiry-centered K-12 mathematics and science education system that supports all learners in attaining success in vigorous, high-quality mathematics and science" have been overwhelmingly conducted according to this timeline. As previously mentioned, some setbacks include NMTC's inability to recruit MST Leaders from each school despite continued effort to do so and the decision to end the Partner's Council due to a lack of involvement and commitment from members. NMTC's activities during Year 3 address many of NMTC's plans and timeline challenges including leadership development, increasing impact on individual schools, focus on community based science, and the emphasis on culturally relevant curriculum. Additionally, CENAC monthly meetings and the NMTC Strategic Planning meeting provide a forum for addressing timelines and increasing deadline adherence.

The NMTC Year 3 Plans included a number of focus areas with specific goals for each program. Goals for the MST School Leaders program included the recruitment of new MSTz from non-represented/underrepresented schools, focus on MSTz leadership roles at their school site, ensuring MSTz lead Brain 101 and Native Applied Brain Classes (NABS) and continuation of action research projects. NMTC aimed to impact individual schools during year 3 by creating Individualized School Plans based on each school's needs/CSRP (Consolidated School Reform Plans). NABS lessons were intended to be led and planned by MSTz with a focus on community based science. A number of goals were set forth relating to Brain Compatible Strategies in Math and Science. These goals included having MSTz each co-teach one class; ensuring classes were offered for all

CENAC teachers at a centralized location on Saturdays for college credit, focusing on specific topics such as Physics and Algebraic Thinking as well as on leadership; supporting the modification and implementation of community based materials (Water's Way, etc.) and promoting the development of a CENAC-wide, culturally relevant science curricula. NMTC's goals relating to the Science Fair included supporting the science fair committee's development of criteria for the CENAC-wide Science Fair in February 2004; helping facilitate the Science Fair; and developing an "Indigenous Science" component.

Year 3 of the NMTC funding reached its completion in August of 2004. During Year 3, the NMTC increased the number of MSTz from non-represented schools by recruiting one MST Leader from a school that did not have any MSTz during year 2. The number of MSTz at four school decreased by one or more people while the number of MSTz at one school increased by two people. The most common focus area of MST Professional Development was "Leadership Development" (24%) depicting NMTC's focus on expansion of leadership capacities within the MST School Leaders Program. An additional goal for MST Leaders included the teaching of Brain Compatible Strategies in Math and Science. Principal questionnaires and teacher interviews indicate that while many teachers are excited about the content of Brain 101 and NABS lessons, additional training leading to a more comprehensive understanding among some teachers is necessary. CENAC Meeting minutes indicate that NMTC has made a strong effort to include all schools in the creation of Individualized School Plans. All interested schools have been encouraged to meet with the PI to create an appropriate plan for their schools. In regards to NABS, MST Leaders and Dr. Shelly Valdez of Laguna Pueblo planned a lesson on pottery to implement in their schools. Observations of and surveys from the 2004 CENAC-wide Science Fair revealed that a judging criterion has been developed for the science fair. A Native Science Award category was also created; however while the category was popular among students and judges, it was recommended by some judges that "criterion need to established for the native categories/constructs...to guide students and their teachers at a local level".

Chapter 2: Outcomes Evaluation

Introduction

NSF established six major activity areas, called “Drivers,” that guide systemic reform. These Drivers also serve as the predominant measure of program progress. Therefore, the following chapter is organized by Driver into six sections providing a framework of evaluating data and program outcomes.

School and Staff Data

Figure 3 presents selected data on the NMTC Schools from the 2003-04 Academic Year. Data included are the number of students enrolled, the number of teachers, the number of mathematics and/or science teachers, the number of MST Leaders, the number of aides, and the number of Native speaking teachers and aides.

Figure 3
List of Involved School and School Data
2003-04 Academic Year

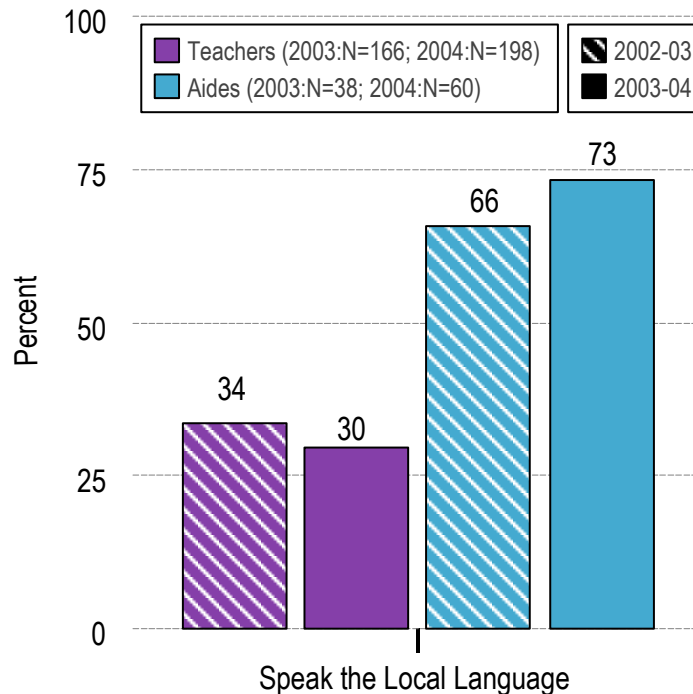
Grades Taught	School	# of students	Total # of teachers	# of mathematic and/or science teachers*	# of MST Leaders*	Total # of Aides	# of Native Speaking Teachers/ Aides
K-6	Isleta Elementary School	245	16	15	1	2	5
K-6	Jemez Day School	142	11	9	2	7	13
K-5	Laguna Elementary School	291	23	21	2	12	11
K-8	Ohkay Owingeh Community School	72	8	5	0	4	3
K-6	San Ildefonso Day School	28	3	3	0	0	1
K-7	San Felipe Pueblo Elementary School	380	28	24	3	14	22
K-6	Santa Clara Day School	119	13	9	1	5	6
K-8	Sky City Community School	280	18	15	1	5	17
K-8	Taos Day School	154	15	12	3	6	10
K-6	Te Tsu Geh Oweenge Day School	19	3	3	0	0	1
K-7	T'siya Day School	76	11	10	1	4	6
7-12	Santa Fe Indian School	549	50	13	2	2	9
	NMTC Schools Total	2,355	199	139	16	61	104

*Teachers of self-contained classrooms are counted as Math and Science teachers for the purpose of this project. The number of MST Leaders reported includes any participants in the program regardless of number of trainings attended.

The number of students ranged from 19 students at Te Tsu Geh Oweenge Day School to 549 students at Santa Fe Indian School for a total of 2,355 students across the NMTC schools. Two schools had less than 30 students and only 3 teachers in Fall 2004. There were 199 NMTC teachers in Fall 2004; 139 of those were mathematics and/or science teachers including elementary teachers. In total there were 16 MST Leaders at the schools with 2 schools having 3 MST Leaders and 3 schools having no MST Leaders. Most students enrolled in the NMTC schools are Pueblo, though SFIS educates a number of students from other Native American Tribes. In Fall 2004 there were 104 Native speaking teachers and aides working in NMTC schools; the number of native speaking teachers and aides is 52% of the total number teachers and aides (30% of teachers are native speaking compared to 72% of aides).

Figure 4 reports the percent of NMTC teachers and teachers' aides that speak the local language by year.

Figure 4
Percent of NMTC Teachers and Teachers' Aides that
Speak the Local Language by Year



The percent of aides that spoke the local language in 2003-04 was more than double the percent of teachers (aides: 73%; teachers: 30%). Additionally, the percent of teachers who spoke the local language fell from 2002-03 to 2003-04 (2002-03: 34%; 2003-04: 30%) while the percent of aides rose (2002-03: 66%; 2003-04: 73%).

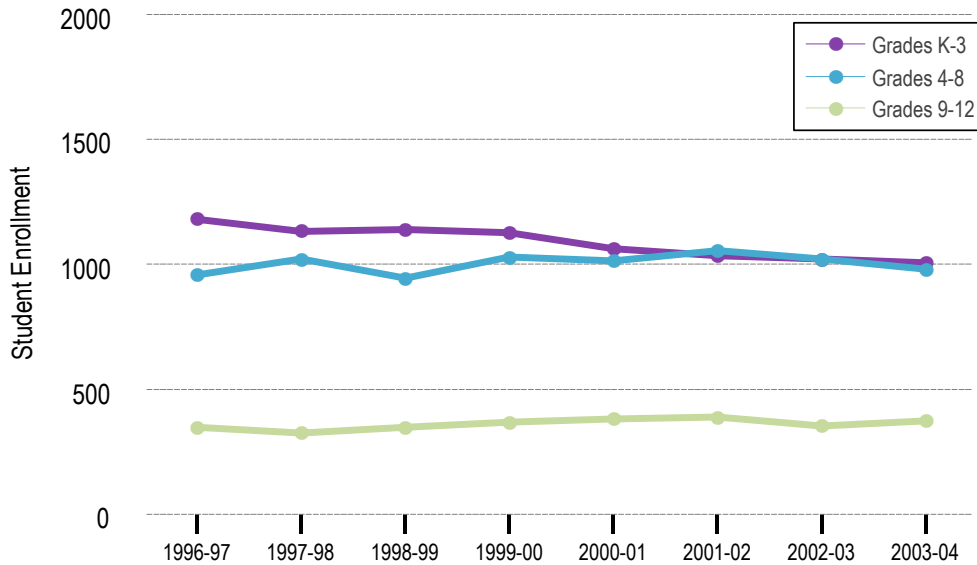
Involvement Classifications

NMTC classifies the participating schools into two categories: Full Involvement and Partial Involvement. This categorization is made based on each school's participation in a variety of programs and commitments. A categorization of Full Involvement is given if *all* of the following conditions are met: (1) principal committed to systemic reform and participates in RSI events; (2) at least one qualified teacher participates in MST School Leaders program and associated Professional Development/Leadership Training; (3) an effective system for communication within the Leadership Team is evident; (4) the Leadership Team has a direct impact on other teachers within the school; (5) other staff and parents participate in RSI activities; (6) the school has included reform strategies in its Consolidated School Reform Plan (CSRPlan) for sustainability of efforts. In 2001-02, 2 schools were classified as Fully Involved, that number rose to 4 schools in 2002-03. During the following year (2003-04), 1 school fell from Fully to Partially Involved, while 2 school rose from Partially to Fully Involved. A school is classified as having Partial School Involvement if *three or more* of the previously identified indicators are met.

Student Enrollment

Figure 5 reports the overall student enrollment across NMTC schools from the 1996-97 academic year to the 2003-04 academic year by grade level groups of K-3, 4-8 and 9-12.

Figure 5
Total Student Enrollment in NMTC Schools* by Grade Level
1996-97 through 2003-04 Academic Years



*Please note that in 1998-99 enrollment data for Okay Owingeh Community School was missing, hence this data was estimated by using the enrollment data from 1997-98 from Okay Owingeh Community School.

Enrollment in Grades K-3 has declined slightly from 1996-97 to 2003-04. In 1996-97, 1,180 students were enrolled in Grades K-3 by 2003-04 Grades K-3 enrollment was 1,002 for a decline of 178 students or 15% over the 7 academic years. Overall, Grades 4-8 enrollment rose slightly from 958 to 977 over the same time-period. Lastly, Grades 9-12 enrollment, which is the enrollment in secondary education at Santa Fe Indian School, remained relatively constant across the 7 years. Enrollment in 1996-97 was 342 and in 2003-04 it was 376 students with a total increase of 34 students across the 7 years.

Section 1: Standards Based Curriculum (Driver 1)

NMTC schools are in the process of fully implementing a comprehensive standards-based curriculum. All of the schools have adopted or are in the process of adopting the New Mexico State Content Standards with Benchmarks (also aligned with national standards). Examples of standards-based curricular materials currently utilized by the schools include Everyday Math 9 (5 schools), MathLand or MathLand/MathScape (3 schools), and Scott Foresman (2 school). Standards-based science materials utilized by the 12 schools vary greatly. Figure 6 lists the 8 components of the standards based curriculum driver as established in the NMTC proposal to the NSF.

Figure 6
Driver I Components

1. MST School Leaders Program
A. Action-Research focused on Mathematics/Science Assessments
B. Community Based Education Curriculum
C. Mathematics/Science Content Lessons
D. Leadership Skills Training
2. Brain-Compatible Strategies in Mathematics and Science Training
3. Leadership Institutes
4. School Reform Rally
5. Enhancing Education through Technology
6. Science Fair
7. Data Management Tools
8. CSRP Support

MST School Leaders Program

NMTC's proposal stated that MST (Math, Science, and Technology) School Leaders be selected from each school site (two leaders per site) based on recommendations from the school's administration and interviews with school staff. Given the vast challenges of recruiting 2 MST Leaders from the smaller schools, especially those with only 3 teachers, the goal of having 2 MSTz per school was dropped. Moreover, MSTz are to possess a number of prerequisites including openness to change, credibility with teachers, effective communication skills, experience, self-confidence, organization, and the ability to work well with peers.

MST Leaders participate in activities to increase their knowledge of math and science learning and teaching as well as to increase their capacity to bring about positive change at their school site. MST Team Leaders are expected to work in partnership with school principals to provide schools with instructional leadership and on-site professional development.

High turnover rates within administrators at tribal schools due to unique challenges in these positions is the primary rationale for the program's usage of MST leaders. Historically, lower turnover rates exist in the teacher population at BIA schools; hence NMTC felt using teachers as MST School Leaders, in collaboration with school administrators and school boards, would benefit the school community by establishing long lasting school based Math, Science, and Technology leadership.

The primary focus of professional development in Years 1 and 2 (as defined in the NMTC’s Proposal) included ensuring that MST Leaders are supported in becoming strong teachers and leaders who demonstrate the teaching strategies identified by the RSI, which are aligned with standards based curriculum.

Figure 7 reports the number of MST Leaders at each school by year. Although NMTC initially intended to have 2 MST Leaders per school, this goal has not been met at all schools, even the larger ones.

Figure 7
Number of MST Leaders at NMTC Schools 2001-02, 2002-03, and 2003-04 School Years

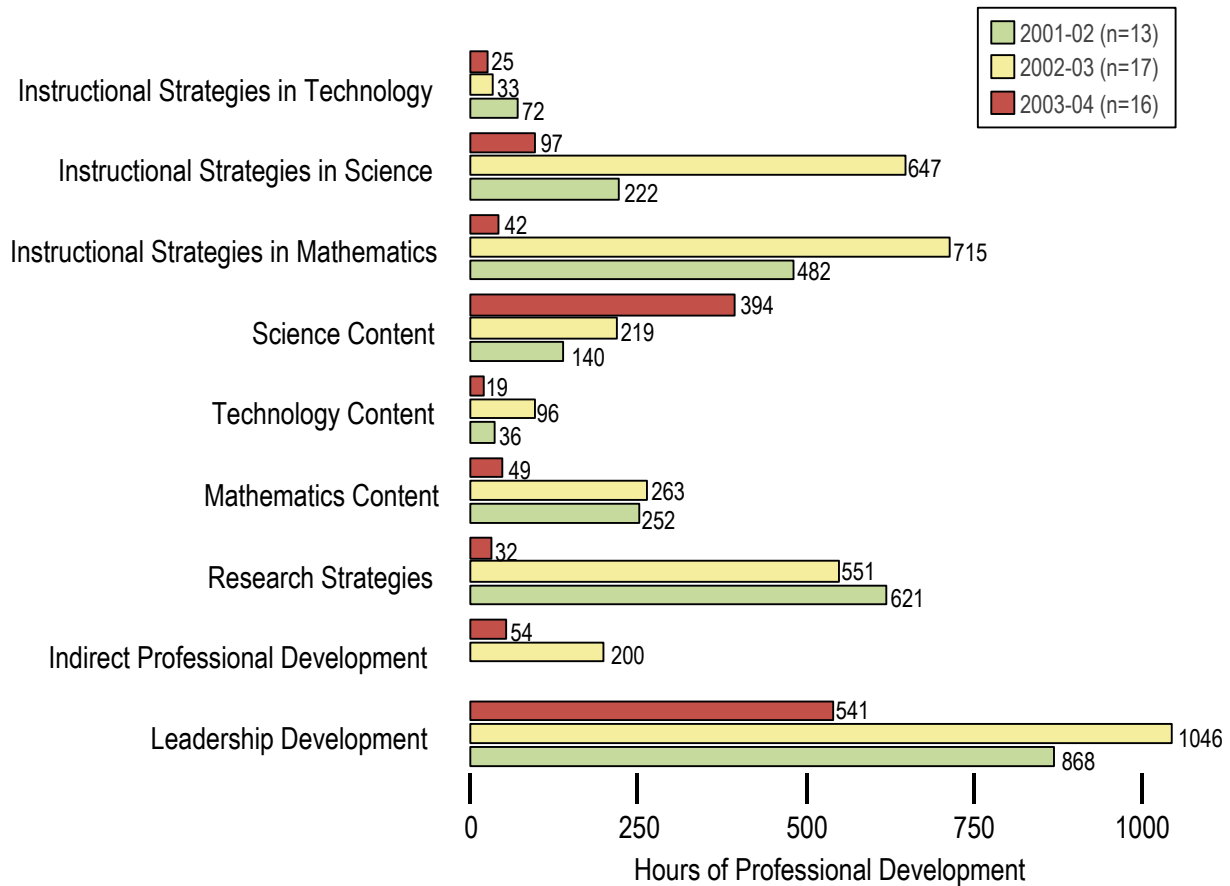
School	Year		
	2001-02	2002-03	2003-04
Isleta Elementary	0	0	1
Jemez Day School	2	4	2
Laguna Elementary	2	2	2
Ohkay Owingeh Community School	1	0	0
San Felipe Elementary School	0	1	3
San Ildefonso Day School	0	0	0
Santa Clara Day School	1	2	1
Santa Fe Indian School	0	1	2*
Sky City Community School	1	2	1
Taos Day School	4	4	3
Te Su Geh Oweengh Day School	1	0	0
Tsiya Elementary and Middle School	1	1	1
Total	13	17	16

*Both MST Leaders at SFIS were minimally involved for the first half of the 2003-04 academic year

Some schools have had 3 or more MST Leaders in a year (for example, Taos Day School had 4 MST Leaders in both 2001-02 and 2002-03 and 3 in 2003-04). On the other hand, 4 schools in 2001-02 and 2002-03 and 3 schools in 2003-04 did not have any MST Leaders. There were 4 teachers who were MST Leaders for only 1 year, 10 teachers who were MST Leaders 2 years, and 7 teachers who were MST Leaders all 3 years. Lastly, in 2001-02, 2 teachers aides were MST leaders while in 2002-03 1 teacher aide and 1 principal acted as MST leaders. In 2003-04, all MST leaders were teachers, though the 2 MST Leaders from SFIS were minimally involved for only the first half of the academic year.

Figure 8 reports the total number of Professional Development hours for MST Leaders by Focus Area for 2001-02 to 2003-04.

Figure 8
MST Leaders' Total Professional Development Hours by Focus Area* and Year

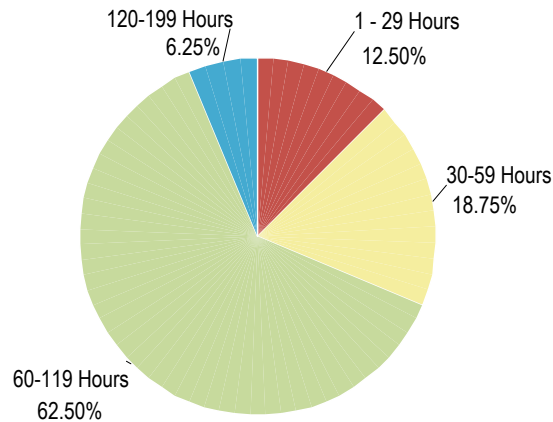


* Indirect Professional Development in most situations is led by MST Leaders.

MST Leaders in 2002-03 participated in the most professional development hours of the 3 program years (2001-02: 2,693 hours; 2002-03: 3,540 hours; 2003-04: 1,253 hours). The rate of professional development hours per MST Leaders remained constant between the first two years (2001-02: 207 hours/person avg.; 2002-03: 208 hours/person avg.) before falling to 78 hours/person avg. in 2003-04. However, it is important to note that in 2003-04, NMTC focused on school-site professional development which was not consistently captured in the database.

Figure 9 reports the number of hours of professional development which MST Leaders participated in during the 2003-04 Academic Year.

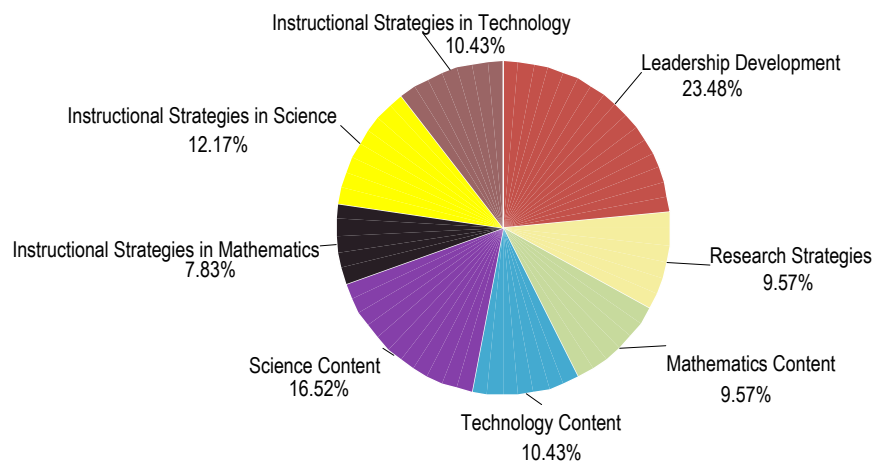
Figure 9
MST Leaders' Professional Development Hours*
2003-04 Academic Year (N=16)



In 2003-04, 6% of the 16 MST participated in 120-199 hours and 63% participated in 60-119 hours. The 2 participants from SFIS had between 1 and 29 hours of professional development, depicting their limited participation.

Figure 10 reports the focus areas of MST Leaders' professional development activities in 2003-04.

Figure 10
MST Leaders' Professional Development Focus Areas*
2003-04 Academic Year



The three most frequent focus areas included Leadership Development (24%), Science Content (17%), and Instructional Strategies in Science (12%). It is appropriate that Leadership Development was the most frequent area of focus for MST Leaders. It also appears that MST Leaders were focusing on science, the two next common focus areas.

2004 NMTC Principal Questionnaires

In May of 2004, a questionnaire was distributed to the 12 NMTC principals in order to obtain their feedback regarding NMTC programs, successes, and areas needing improving. Four principal questionnaires were completed (one principal, who at that time of the questionnaire was principal for two schools, filled out two of these questionnaires); these questionnaires will be discussed throughout this evaluation report. Principals were asked to rate a number of NMTC programs from 1 to 5 with 1 being “poor” and 5 being “excellent”. They were then asked to comment on the positive and negative aspects of the NMTC programs. Lastly, principals commented on the NMTC’s overall impact, their school’s needs in ensuring NMTC success, changes in teacher capabilities, problems and suggestions.

Principal Feedback regarding MST Leaders

In regards to MST Leaders, two ratings of “NA” were given, along with one rating of “excellent” and one rating of “fair”. One principal responded “Super program”. Another stated their difficulties given that the principal position had changed 4 times since August, 2003.

MST Leader Interviews – November 2004

In order to gain valuable insight from teachers involved in NMTC as MST Leaders, Rachel McCormick of Minnick & Associates interviewed 5 MST Leaders at 5 NMTC schools. Three teachers of self-contained classroom at the K-6 level, 1 secondary math teacher and 1 secondary science teacher were interviewed. Two of the responding MST Leaders were Native; one taught at her own Pueblo.

Involvement – Most of the MST Leaders became involved in the MST program when the NMTC’s PI came to their school to speak about the NMTC and ask for volunteers. Their reasons for becoming involved in the program included, “I really feel that my school needs to improve on areas touched by NMTC. Math and science are our big weaknesses”, “I wanted our students to go much further than they were going” and “for the opportunity to do a lot of professional development and advance my own knowledge base”. Three teachers reported that they did not have any initial reservations about becoming an MST Leader. One teacher was concerned about the time strain on his/her family and the other teacher was concerned about missing meetings at his/her school.

Responsibilities – The interviews revealed that MST Leaders were responsible for coordinating Family Math and Family Science nights at most schools. Two MST Leaders also reported their responsibilities include participation in Science Fair planning and organization. Additionally, all teachers reported filling an informal role as math and science leaders at their schools, doing things like helping teachers who need guidance, providing resources, assisting teachers with instructional strategies, and sharing lesson plans. Three teachers reported that they had been told they could or should utilize school faculty meetings to do professional development trainings. However, all teachers reported that these trainings never occurred or only occurred once or twice.

Challenges Faced – Three teachers noted that they were challenged in trying to “get other teacher involved” and “delegating the workload”. Two teachers commented that missing staff development days at their school when they attended MST training sessions had negative impacts on their leadership roles. One MST’s statement that “getting everyone at school involved and working to improve their teaching” is the greatest challenge faced by MST leaders was an opinion shared by most of the MST Leaders. Another common challenge faced by MST leaders was ensuring that math and science were seen as critically important. At 2 schools, the MST Leaders felt reading took priority over all other subjects.

Support Received – When asked about the support they received from the NMTC when beginning their role as MST Leaders, all 5 interviewees commented that the trainings provided by NMTC were beneficial in a number of ways. For example, one respondent stated, “All the trainings, homework and readings I did through NMTC helped both my classroom and my role as an MST Leader at my school”. The 5 MST Leaders reported attending most or all of their MST training sessions. Support received from their school as MST Leaders revealed a variety of levels of administrative support across the 5 schools: 2 MSTs reported that their principals were very supportive, while 2 indicated they had faced a number of challenges due to administrative turnovers and other concerns.

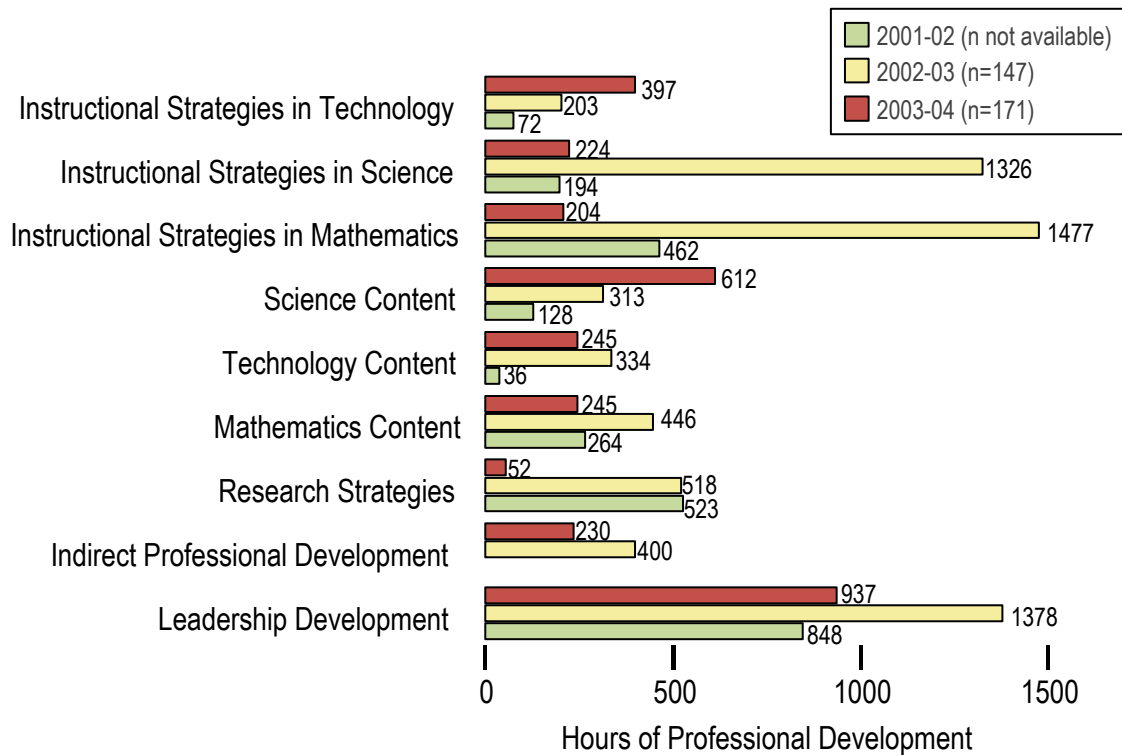
Evaluation - The MST trainings provided by the NMTC were rated very highly by all MST Leaders. On a scale from 1 to 10, the three areas of trainings MST leaders were asked to rate (Content, Instructional Strategies, and Inclusion of Native Ways) each received “10s” from all but one respondent. The interviewees mentioned that the strengths of their training included “the support system created between NMTC schools”, “the applicability of the trainings – they could be used the next day in the classroom”, “the receipt of college credit” and the “cutting-edge nature of all presentations”. The primary concern with MST trainings, which was noted by all interviewees, was “time”. MST leaders felt that they are already primary leaders at their schools and hence are stretched for time. Therefore, homework wasn’t always completed. Additionally, teachers needed to juggle multiple responsibilities, especially on Fridays when meetings were being held at their schools yet they also needed to be at MST trainings.

Impact – MST leaders were all enthusiastic about the impact being an MST Leader had made on their own teaching. Three interviewees mentioned having become more familiar with content standards, one noted that “the networking and sharing that was done between teachers about lessons was great”. Teachers all found the ‘Inclusion of Native Ways’ training enlightening, and noted that it had allowed them to increase the usage of Native ways in their classroom. One teacher noted “in science the ‘Inclusion of Native Ways’ training helped a lot, in math it did not”. A common theme of the interviews was teachers’ (both Native and non-Native) hesitation to touch upon some traditional ways of the Pueblo where they teach because they feared violating privacy and/or religious customs. Some teachers dealt with this concern by asking Native teachers at their school what was appropriate, others seemed to stay away from teaching about certain Native ways. When asked about the overall impact of the MST program on their school, MST Leaders said things like “we influence math and science through modeling and sharing in an informal way”, “parents math and science nights are really good”, “we’ve been able to bring in scientists from LANL to help teach us and work with our students” and “the school has gotten a sense of the content standards we need to meet and what needs to be done in our classrooms in order to meet them”.

Professional Development for Teachers

In addition to the professional development provided to MST Leaders, professional development has been implemented to impact all schools and their teachers, teaching assistants, school staff, school boards, and parents/community members. Figure 11 reports the total Professional Development hours completed by NMTC teachers by Focus Area for 2001-02, 2002-03, and 2003-04.

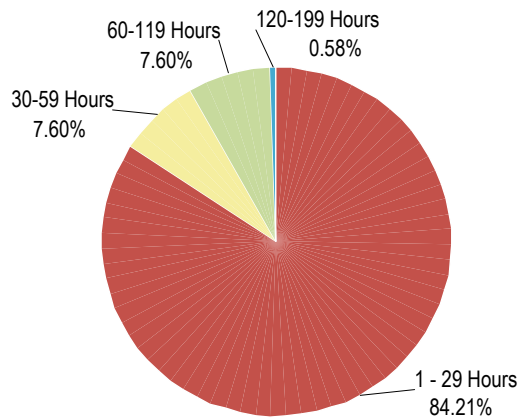
Figure 11
Teachers' Total Professional Development Hours by Focus Area and Year



Teacher participation in professional development rose across all focus areas except ‘Research Strategies’ from 2001-02 to 2002-03. In 2001-02, the three focus areas with the most hours of professional development among NMTC teachers included ‘Leadership Development’ (848 hours); ‘Research Strategies’ (523 hours) and ‘Instructional Strategies in Mathematics’ (462 hours). From 2002-03 to 2003-04, the number of NMTC teachers’ hours of professional development in ‘Instructional Strategies in Technology’ nearly doubled from 203 in 2002-03 to 397 in 2003-04 and the number of hours in ‘Science Content’ also nearly doubled from 313 in 2002-03 to 612 in 2003-04. On the other hand, there were notable declines in the remaining areas. These declines are likely reflective of NMTC’s professional development becoming more increasingly more school-based and many of these training sessions not being captured by NMTC’s data collection methodologies.

Figure 12 reports the number of professional development hours completed by NMTC teachers during 2003-04.

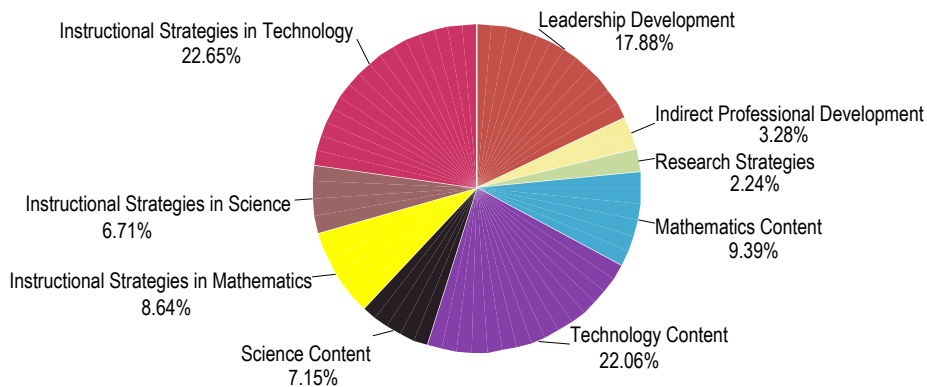
Figure 12
Teachers' Professional Development Hours
2003-04 Academic Year (N=171)



Approximately 27 teachers (15%) received 30 or more hours while more than three-quarters (85%) received between 1 and 30 hours.

Figure 13 reports the Focus Area of teachers' professional development during the 2003-04 Academic Year.

Figure 13
Teachers' Professional Development Focus Areas
2003-04 Academic Year



The three most common focus areas among teachers included 'Instructional Strategies in Technology (23%)', 'Technology Content' (22%) and 'Leadership Development' (18%). Conversely, teachers' least common focus areas included 'Research Strategies' (2%) and 'Indirect Professional Development' (3%).

NMTC Teacher Interviews – November 2004

In order to gain valuable insight from teachers involved in NMTC professional development trainings, Rachel McCormick of Minnick & Associates interviewed 6 teachers, and 1 teacher's aide at 5 NMTC schools. The interviews solicited information and feedback regarding the respondents' involvement in NMTC professional development trainings during the 2003-04 academic year. Three teachers of self-contained classroom at the K-6 level, 1 secondary math teacher, 2 secondary science teachers and 1 teacher's aide were interviewed. Time constraints and other setbacks led to not all questions being asked of each interviewee.

NMTC Professional Development Training – Five respondents were asked about overall NMTC professional development training. Four of the five teachers rated the 'overall math and science professional development training received through NMTC/CENAC' as "9" or "10" on a scale of 1 to 10, while one teacher gave a rating of "8". Respondents said things like "It is extensive and sensitive to the needs of everyone. It tries to raise the math and science teaching standards", "Everything we learned was applicable – I could use it in class the next day and to develop lesson plans", and "I was teaching some skills that I wasn't really good at. Now I have lots of confidence in those skills and my teaching". When asked about the most helpful trainings they attended, 3 respondents mentioned Action Research Training, 3 mentioned NABS, 3 mentioned Brain 101, 1 mentioned Edutest, and 1 mentioned the summer math course on Everyday Math.

On the other hand, when asked about trainings they did not find helpful, 1 teacher reported that Edutest training was not helpful to him/her and another teacher found the CENAC Rally was not helpful. Teachers also were asked a number of questions about the following trainings if they had participated: NABS, the MathLand Study Group, the Summer Math Course, and Community based education training. Only NABS trainings had more than two respondents and hence responses will not be individually identifiable; these results are summarized below. The Summer Math Course and MathLand Study Group are combined for reporting given confidentiality concerns and their similarities as trainings focused on math content and instructional strategies.

Respondents were also asked to rate and comment on what improvements could be made 'to make trainings more beneficial to teachers like you' for three other NMTC professional development trainings, if they had attended. Edutest training received 2 "6s", 1 "8", 1 "9" and 1 "10". Recommendations relating to Edutest included increasing the number of teachers attending the trainings, providing technology assistance after trainings, and providing more samples. One teacher noted, "Edutest training was great, but we had lots of technical problems at our school so we never got to use our Edutest training". Only two respondents had attended MST Led Trainings, both gave a rating of "9" and recommended increasing the number of trainings and the time allotted for the training. Three respondents attended Action Research Training, rating it very high with 1 "9" and 2 "10s". The one recommendation for improving Action Research Training was to increase the number of trainings.

Areas of NMTC Trainings that need to be Strengthened – There were two recommendations given for improving NMTC trainings when teachers were asked 'What are the overall areas of NMTC/CENAC professional development trainings that you feel need to be strengthened'. These two recommendation were "there needs to be a way to get teachers interested in what MST Leaders are doing" and "the trainings should be more closely knit with curriculum development". The remaining three teachers had no recommendations or complimented NMTC. One teacher said, "NMTC has time to think about what we need and they bring it to the table in a timely manner and in a way that teachers can understand and then address".

Community's Role in Math and Science at Your School – Due to time limitation and other setbacks, only four teachers responded to a question regarding 'the community's role in math/science education at your school'. Two teachers mentioned great turnouts at Family Math and/or Science Nights at their schools. One noted that

“community members are mentors and judges for the Science Fair. We’ve gotten a lot of Native Science Category participants as a result”. Two teachers reported that their school has a science program run by community members which integrated Native Ways and provided fieldtrips on Pueblo lands. On the other hand, one teacher found that elders were often coming to the school looking for ways to help, yet teachers were not accepting their offers or inviting them into their classrooms.

Teachers were then asked about community members’ ‘direct involvement with the school in determining math/science content, instructional strategies, and inclusion of native ways’. Three teachers responded to these questions. All respondents reported that community members did not have any involvement with the school in determining math/science ‘content’. One teacher mentioned that there was limited involvement on a classroom basis at her/his school. The respondents also reported that community members do not have any direct involvement with the school in determining math/science ‘instructional strategies’. All three respondents found that community members are directly involved in determining the ‘inclusion of native ways’ in math/science at their school. Two teachers noted that their school has a Native Language program wherein students are taught their native language as well as other cultural knowledge. Much of the content is unknown to the teachers as they are not allowed to sit in on these privileged cultural teachings unless they are from the Pueblo where they teach. Two opposing opinions regarding parental satisfaction and involvement were offered by two of the respondents: one found that “most community involvement in the ‘inclusion of native ways’ is done when community members hear about what is being taught in relation to Native ways and complain to administrators to have the teaching stopped”; the other teacher stated, “teachers are put on a pedestal in this community – they can do no wrong. Community members don’t see themselves as able to impact education, so they don’t always get involved because they believe teachers will do their best”.

Lastly, respondents were asked about ‘the inclusion of Native ways specific to the Pueblo where you teach’ and ‘the inclusion of Native ways in general’ in math/science at your school. Only two teachers responded to this question. One mentioned that not much was done in math, but in science most of the teaching of Native ways specific to the pueblo are done by Native Teacher’s Assistants (TAs) from the Pueblo; the teacher further reported that these lessons are held almost daily for K-3 and once a week for upper grades. The other teacher noted that about one-third of the teachers at her/his school are native, yet only she/he, who is not Native, has taken NABS training. Both teachers were not sure about the ‘Inclusion of Native ways in general’ in math/science education at their school’, but one thought maybe this was covered by the Native TAs.

Brain-Compatible Strategies in Mathematics and Science Training

The NMTC’s 2002-03 Annual Report reported on Year 2 of Brain-Compatible Strategies I Mathematics and Science Training; the following paragraph summarizes this information. During the 2002-03 school year, MST School Leaders attended a 7-session, 7-hour-a-session workshop sponsored by the NMTC with 48 other teachers, aides, and dorm staff from CENAC Schools. MST School Leaders also attended the Brain Expo, a week long conference in January 2003. The NMTC’s Annual Report stated that NMTC Research Interns analyzed MST Leaders’ implementation of learned strategies by observing classrooms in order to measure if brain compatible learning strategies were being utilized. These interns noted that teachers used the following physical strategies: open windows for fresh air, water bottles for each student, and the use of color. MST Leaders also incorporated the following strategies in their pedagogy: introducing goals in age-appropriate language, hands-on experiences, “chunking” instruction, and following a routine.

Native Applied Brain for Science (NABS) are classes developed by MST School Leaders and NMTC staff with the assistance of Dr. Shelly Valdez of Laguna Pueblo. The goal of NABS classes is to bridge the gap between native science and western views of science. The four topics selected for NABS in Fall of 2003 were Pottery, Hide Tanning, Architecture, and Food. The NABS class on Pottery provides an example of the theory and

application of NABS. First, cultural and community experts were paired with western scientists for an examination of the relationship between native knowledge of pottery making and the western science behind pottery. Two Pueblo potters explained the pottery making process; the pottery demonstration was followed by a lesson from western scientists teaching about chemical bonding in pottery. Lastly, Dr. Valdez, MST School Leaders and NMTC staff planned a lesson/unit on pottery to implement in the schools.

Teacher Interview Feedback Regarding NABS – November 2004

Five of the responding teachers had participated in NABS trainings and were asked a number of questions, including ones regarding their skill level related to NABS prior to and following the training, what instructional strategies were used, their use of the training in their classroom, and recommendations for future trainings. All five teachers indicated that they had minimal, if any, knowledge of NABS prior to their trainings. One teacher mentioned involvement in the Brain 101 classes, which she/he felt led into NABS by promoting traditional Native Ways. Most of the teachers rated their skill level related to NABS prior to the trainings on a scale of 1 to 10 between “0” and “5” for Content, Instructional Strategies, and Inclusion of Native Ways. Following their NABS training, those ratings had increased to between “5” and “9” for all three areas among all respondents. Four teachers attended “all” the NABS sessions, one attended “most” of the sessions. When asked ‘What skills do you remember being taught at the training’, respondents said things like “Looking at an aspect of native culture and applying Western science to it”, and “Knowing the science behind the culture”. When asked about the teaching methods used, all the respondents noted that most sessions followed the lecture, hands-on activity (sometimes), then discussion format. Two teachers commented that hands-on activities were limited.

When asked to rate the instructors, all respondents gave both the Native scientists and the Western scientists ratings between “8” and “10” for reasons like “both groups were really good at showing their perspectives in traditional ways” and “the Native scientists were masters and the Western scientists were very good at looking at the western science behind culture”. However, four of the five teachers felt that they lacked the science content knowledge to fully understand and follow what was being taught by the Western scientists. When asked ‘How often do you use your training in the classroom?’ most teachers reported that their perspectives on integrating culture had changed and hence they used their training often and in a number of areas. Teachers gave examples like “we made story jars using clay”, “we did some reconstruction of ovens in the community and worked with adobe, corn, and pinon”, and “when we talked about rocks, we talked about arrowheads”. One teacher commented that while she/he does some integration of Native Ways, it is the Native teaching assistants who do most of the teaching of Native ways at the school. When asked about ‘difficulties faced in implementing training in your classroom and practices taught that were ineffective in your classroom’, two teachers mentioned time restrictions (ie. they did not have the time to cover all the content they needed and use NABS approaches), one teacher mentioned “tribal restrictions of traditional knowledge and my reluctance to step on toes regarding the teaching of Native ways”, and one teacher mentioned the “emphasis on language arts and math at my school inhibits teaching of science and social studies”.

When asked for recommendations for future NABS trainings, the following suggestions were given “have more hands-on experiences during the trainings”, “stick with one area for the whole semester”, “more help for those of us that don’t have strong science backgrounds”, and “have more follow through”. One teacher said “None. It’s great. It’s the best thing that could have happened to my classroom”. Teachers were also asked to comment on ‘How the trainings helped you to increase the use of Native ways specific to the Pueblo where you teach in math and science’. Teachers said things like “the NABS unit helped the whole school to focus on having an actual ‘Native Curriculum’, which wasn’t there before”; “I ask more questions now about what symbols mean and about the use of storytelling”; and “now I can look through different lenses to help students and I have more community members coming into my classroom”. When asked how trainings helped ‘you to increase the use of Native ways in general in math and science’, one teaching noted that this is done more often in science than in

math and usually through using geometry and patterns because it's hard for her/him to relate math to Native ways. Another teacher said that she/he now has "more appreciation for the traditions" and that she/he now "sees how hard it is to keep a balance between holding traditions and being in the world without being left behind". Yet another teacher noted, "I'm cautious about what is and isn't acceptable to teach. I'm comfortable with asking a teacher from this Pueblo if things are okay, but it's hard to know on my own what should be addressed and what shouldn't".

Lastly, teachers were asked "How do you feel the NABS training has benefited the Pueblo community where you teach?". Two teachers reported that NABS was not yet fully implemented, but when it was they felt it would be very beneficial. One teacher commented that "some of the Native teachers are seeing how valuable the NABS training is". Another noted, "it gives students a sense that they are doing math and science everyday in their community life. They see that their ancestors were doing so much math and science, which gives them a lot of value and pride in their culture. It opens a new door for the student". Finally, one teacher said that the Pueblo community doesn't know much about the NABS training, yet she/he has increased the number of community members visiting her/his classroom as a result.

Principal Feedback Regarding Brain-Compatible Strategies in Math and Science Training

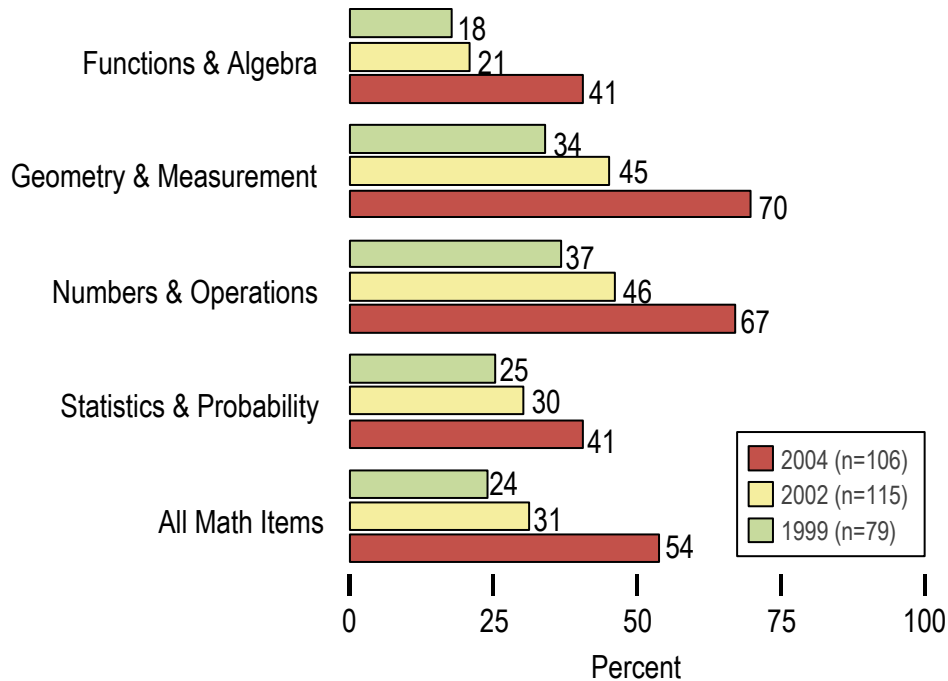
Principal feedback indicated that principals find the Brain-Compatible Strategies in Mathematics and Science Training valuable and with great potential, but find further implementation and support is necessary. Ratings from the four received principal included 1 "satisfactory", 1 "good" and 2 "excellent". A principal mentioned that "I attended and the lessons were invaluable". Another stated, "Staff are excited about brain-compatible strategies". One area needing improvement addressed by a principal is teacher comprehension of the status of math and science at their schools, the principal stated, "Overall understanding of how math and science are doing is about poor to average". The questionnaires also asked for principals feedback regarding NABS. Two rating of "excellent" were given along with one rating of "Satisfactory", the remaining principal was not familiar with NABS due to his/her recent hire.

Teacher and Student Math and Science Surveys

Mathematics – Content Standards Surveys (1999, 2002)

In 1999, 2002 and 2004, a sample of NMTC teachers took a survey designed to assess their comfort with teaching math content. Figure 14 reports the percent of teachers comfortable teaching the materials in four math content areas.

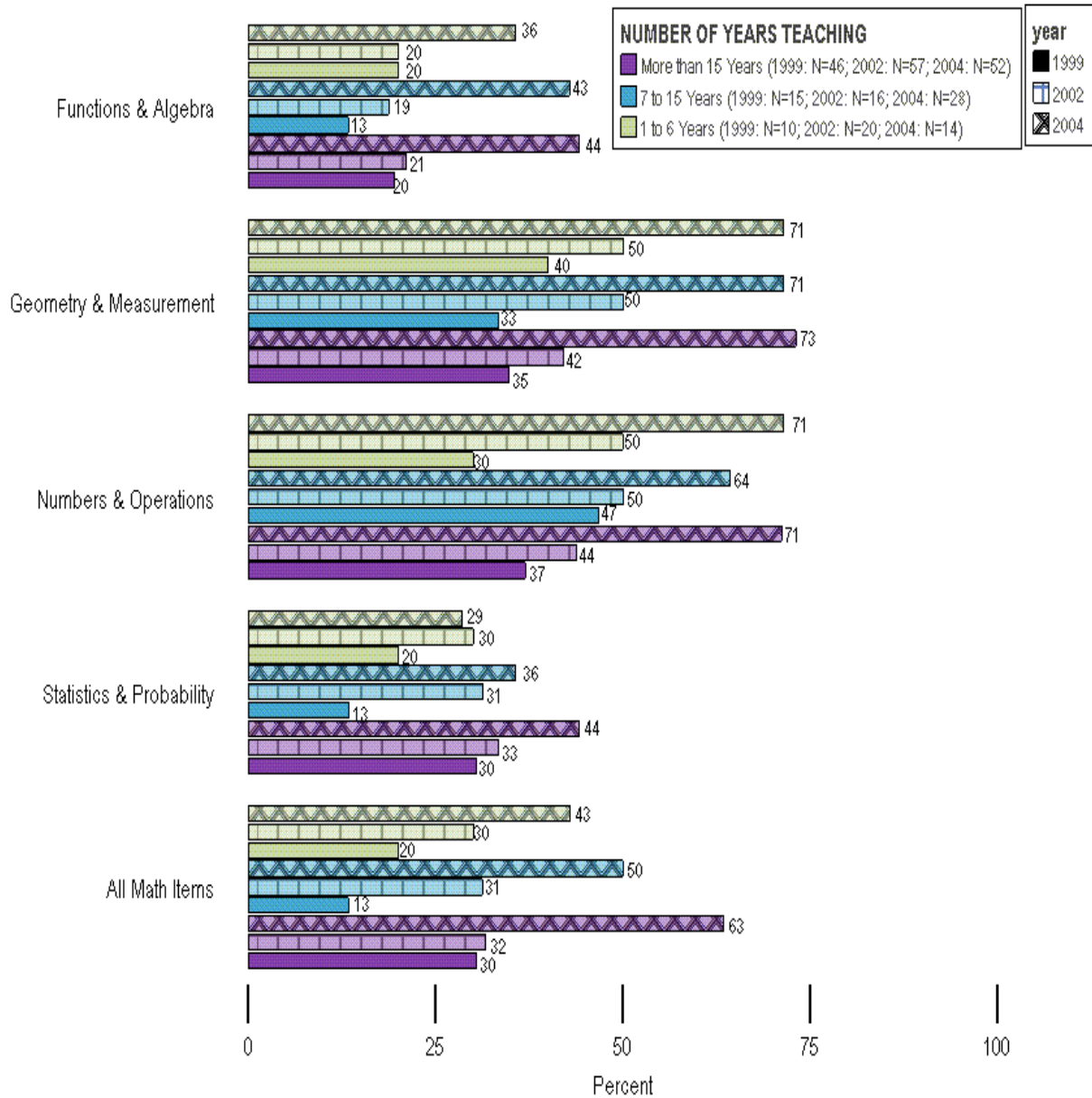
Figure 14
NMTC K-8 Math Content Standards Survey
Percent of Teachers Comfortable Teaching 75% or more of Math Content
(1999, 2002, and 2004)



In all areas, the percent of respondents comfortable teaching 75% or more of content in each area rose from 1999 to 2002 and from 2002 to 2004. ‘Functions & Algebra’ was the area in which the fewest teachers felt comfortable across all years (1999: 18%; 2002: 21%; 2004: 41%). On the other hand, the most teachers felt comfortable teaching ‘Numbers & Operations’ across all years except 2004 (1999:37%; 2002: 46%; 2004: 67%). For ‘All Math Items’, the percent of respondents reporting comfort teaching 75% or more of content rose from 24% in 1999 to 31% in 2002 for an overall increase of 7 percentage points. From 2002 to 2004, the percent of respondents comfortable teaching ‘All Math Items’ rose by 23 percentage points from 31% to 54%.

Figure 15 examines the survey data reported in Figure 13 by number of years teaching.

Figure 15
NMTC K-8 Math Content Standards Survey
Percent of Teachers Comfortable Teaching 75% or more of Math Content
in Content Areas by Number of Years Teaching*
(1999, 2002 and 2004)



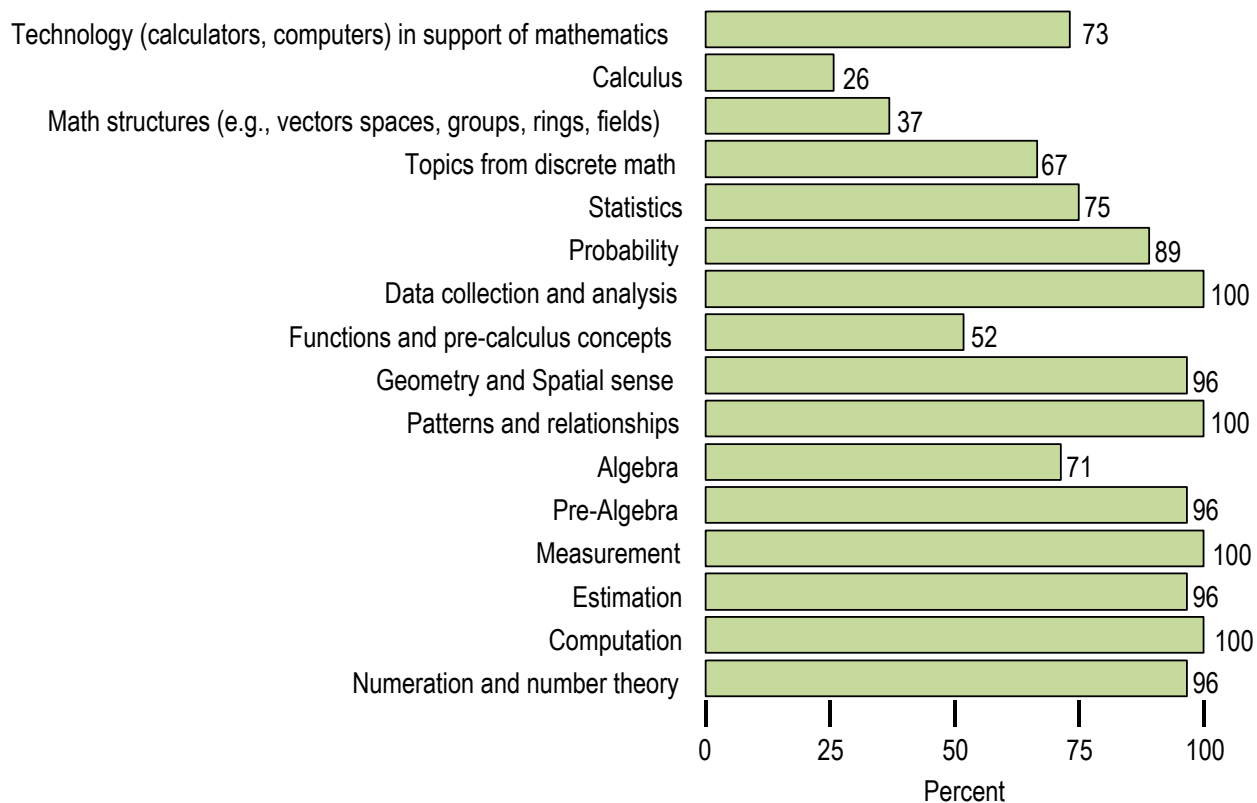
*Please note that in 1999, 8 teachers (10%) in 2002, 22 teachers (19%), and in 2004 12 teachers (11%) did not indicate the number of years they have taught. These teachers have been excluded from the above figure.

In general, there was more variation between the three groups (more than 15 years, 7 to 14 years, and 1 to 6 years) in 1999 and 2004 than in 2002. In two of the content areas (Functions & Algebra and Statistics & Probability), teachers with 7 to 14 years of experience had larger gains in comfort levels than did teachers with more than 15 year experience. Overall, 30% of teachers surveyed in 1999 with more than 15 years experience were comfortable teaching 75% or more of All Math Items, in 2002 that number had risen by only 2 percentage points. However, from 2002 to 2004, the percent of teachers with more than 15 years experience comfortable teaching 75% or more of All Math Items nearly doubled from 32% to 63% for an overall increase of 31 percentage points. Comfort levels of teachers with 7 to 15 years rose from 13% in 1999 to 31% in 2002 to 50% in 2004 of those surveyed for a steady increase of 37 percentage points. Teachers with 1 to 6 years experience had the least overall increase (23 percentage points) from 1999 to 2004; the percent of surveyed teachers with 1 to 6 years experience comfortable with 75% or more of All Math Items increased from 20% in 1999 to 30% in 2002 to 43% in 2004.

Mathematics - Teacher Pedagogy Survey

In May of 2004, Teacher Pedagogy Surveys were distributed to all NMTC mathematics and science teachers; 30 teachers returned their surveys. Figure 16 reports the percent of survey respondents who feel “adequately” or “very well” qualified to teach topics in mathematics.

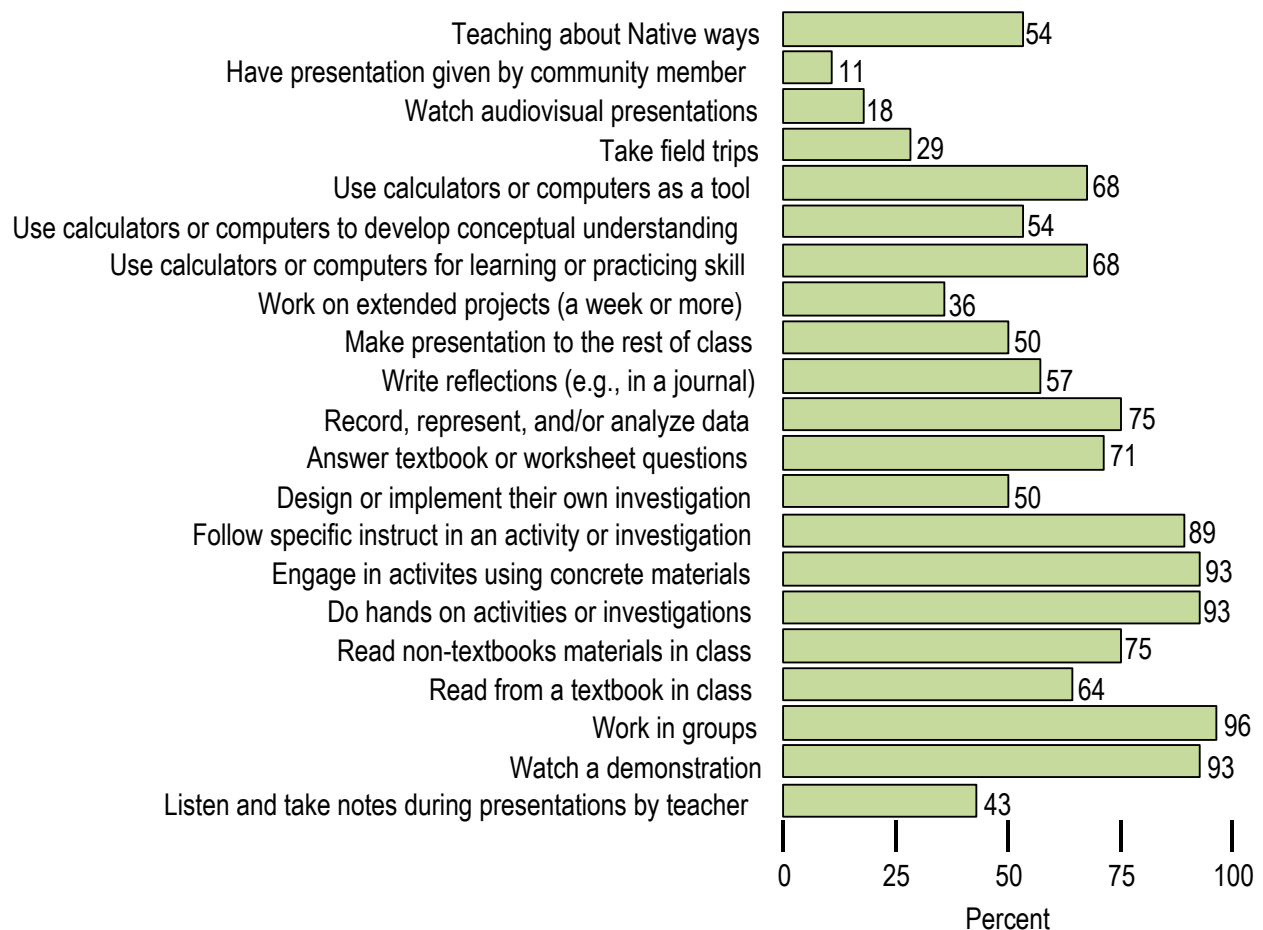
Figure 16
NMTC Teacher 2004 Pedagogy Survey - Mathematics
Percent of Teachers who Feel “Adequately” or “Very Well” Qualified to Teach Topic (N=28)



Ninety-five percent or more of respondents felt “adequately” or “very well” qualified in the areas of ‘Data collection and analysis’ (100%); ‘Geometry and Spatial sense’ (96%); ‘Patterns and relationships’ (100%); ‘Pre-Algebra’ (96%), ‘Measurement’ (100%), ‘Estimation’ (96%), ‘Computation’ (100%), and ‘Numeration and Number Theory’ (96%). However, about a half or less felt “adequately” or “very well” qualified to teach ‘Functions and pre-calculus concepts’ (52%), ‘Math Structures’ (37%), and ‘Calculus’ (26%).

Figure 17 reports the percent of responding teachers who indicated that students in their classrooms take part in activities “frequently” or “almost always” in Mathematics.

Figure 17
NMTC Teacher 2004 Pedagogy Survey - Mathematics
Percent of Teachers who Report that their Students Take Part in Activity
“Frequently” or “Almost Always” (N=28)



Half of the teachers or less reported that their students “frequently” or “almost always” take part in these activities: ‘Have presentations given by community members’ (11%); ‘Watch audiovisual presentations’ (18%); ‘Take field trips’ (29%); ‘Work on extended projects (a week or more)’ (36%); ‘Make presentations to the rest of class’ (50%); ‘Design or implement their own investigation’ (50%); and ‘Listen and take notes during presentations by teacher’ (43%). On the other hand, 85% or more of teachers reported that their students take

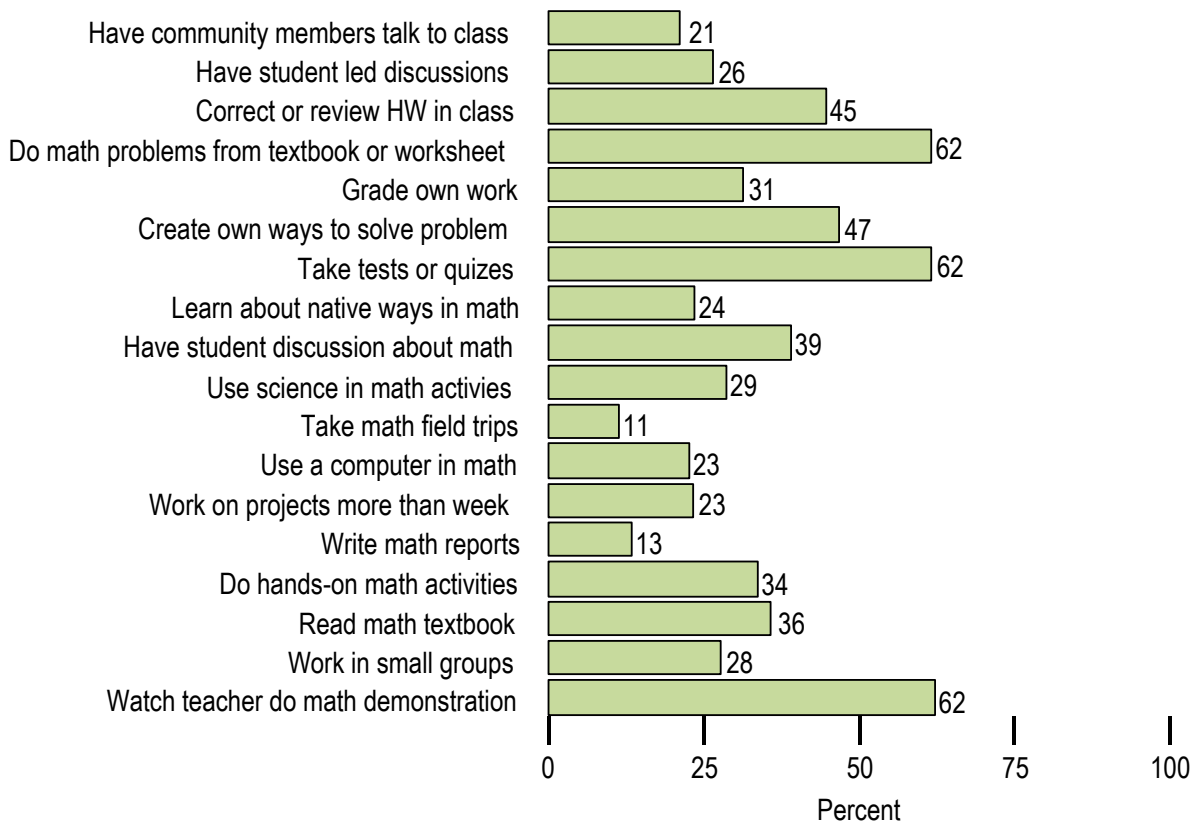
part in the following activities “Frequently” or “Almost Always”: ‘Follow specific instructions in an activity or investigation’ (89%); ‘Engage in activities using concrete materials’ (93%); ‘Do hands on activities or investigations’ (93%); ‘Work in groups’ (96%); and ‘Watch a demonstration’ (93%).

Student Surveys – Mathematics

In May of 2004, surveys to measure students’ perceptions of the frequency of activities in their mathematics and science instruction as well as their attitudes towards mathematics and science were distributed to NMTC schools; 250 student surveys from self-contained classrooms and 37 student surveys from non-self contained classrooms were collected. The following 4 figures report on data from the students in Grades 3, 4, 5, and 6 in self-contained classrooms. Students in Grades 7 and 8 (4 students, 2%), and students in multiple grade level classrooms who did not report their grade level (7 students, 3%) have been excluded from these graphics in order to ensure the comparison of a similar group of students.

Figure 18 reports the percent of respondents in self-contained classrooms who reported that they do the following activities “a lot” or “almost always”.

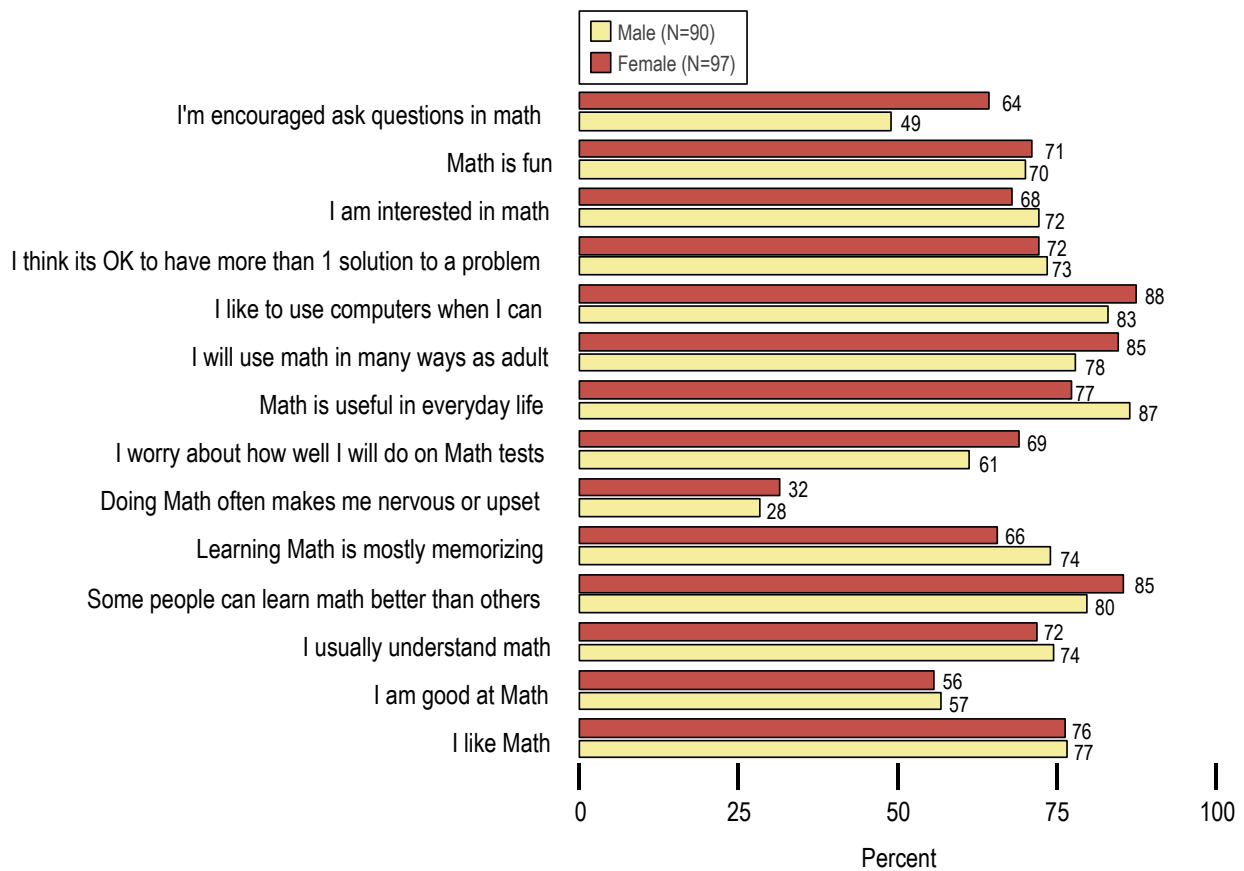
Figure 18
2004 Student Survey - Mathematics
Percent of Grade 3, 4, 5, and 6 Students in Self-Contained Classrooms
who responded they do the following activities “A lot” or “Almost Always” (N=239)



The three activities with the most students reporting they did them “a lot” or “almost always” included ‘Do math problems from textbook or worksheet’ (62%); ‘Take tests or quizzes’ (62%); and ‘Watch teacher do demonstrations’ (62%). On the other hand, the fewest students reporting doing the following 4 activities “a lot” or “almost always”: ‘Take math field trips’ (11%); ‘Write math reports’ (13%), ‘Have community members talk to class’ (21%) and ‘Learn about native ways in math’ (24%).

Figure 19 reports the percent of Student Survey respondents in self-contained classrooms who “agree” or “strongly agree” with the following statements by gender.

Figure 19
2004 Student Survey - Mathematics
Percent of Grade 3, 4, 5, and 6 Students in Self-Contained Classrooms
who “Agree” or “Strongly Agree” by Gender



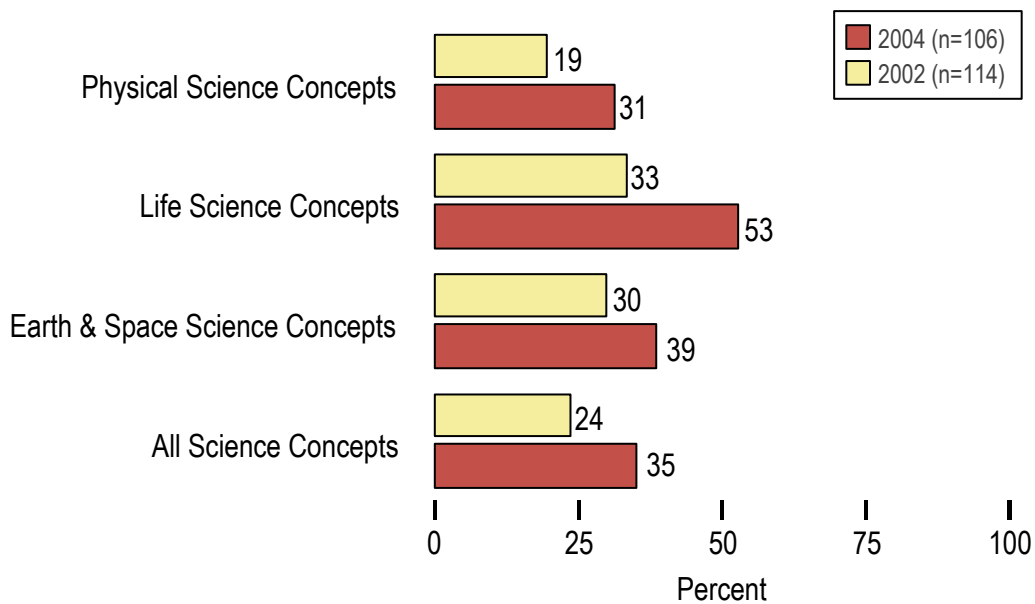
*Please note that 52 students (or 21%) did not indicate their gender, hence they have been excluded from this graphic.

Females “agree” or “strongly agree” notably more than males that ‘I’m encouraged to ask questions in math’ (female: 64%; male: 49%), ‘I will use math as an adult’ (female: 85%, male:78%) and ‘I worry about how well I will do on Math tests’ (female: 69%, male 61%). Males “agree” or “strongly agree” notably more than females that ‘Math is useful in everyday life’ (male: 87%, female 77%). The two statements with the lowest percent of students who “agree” or “strongly agree” across gender were ‘Doing Math often makes me nervous or upset’ (female: 32%, male: 28%) and ‘I am good at Math’ (female: 56%, male 57%). Seventy-six percent of both male and female responded “agree” or “strongly agree” that ‘I like Math’.

Science – Content Standards Survey (2002 and 2004)

In 2002, a sample of NMTC teachers took a survey to measure their comfort with teaching science content. Figure 20 depicts the percent of teachers who were comfortable teaching 75% or more of Science Content in 2002 and 2004.

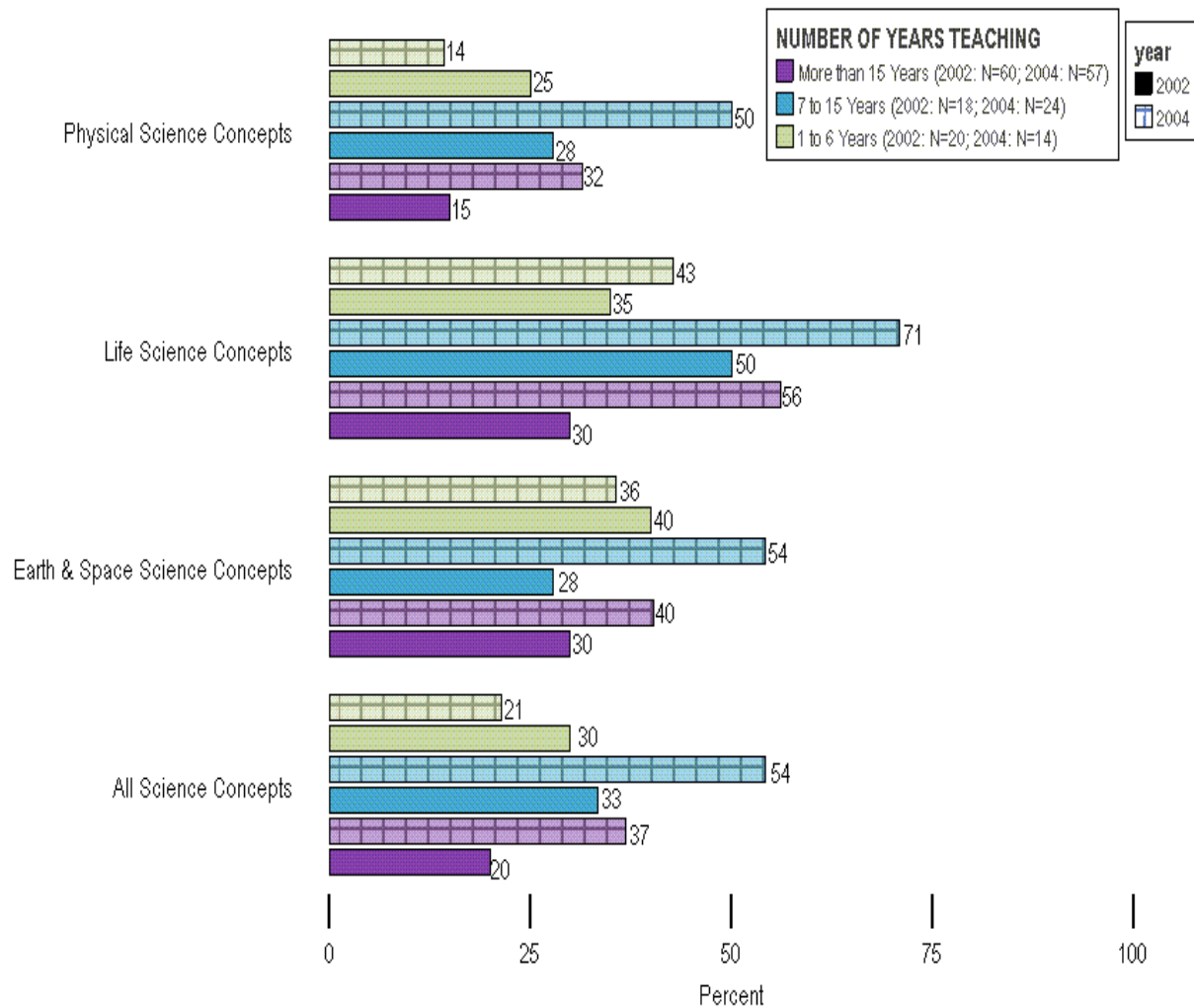
Figure 20
NMTC K-8 Science Content Standards Survey
Percent of Teachers Comfortable Teaching 75% or more of Science Content
(2002 and 2004)



Across all Content Areas, the percent of teachers comfortable teaching 75% or more of content increased from 2002 to 2004. The most dramatic increase was in ‘Life Science Concepts’ (2002: 33%; 2004: 53%). Overall, the percent of teachers comfortable with 75% or more of ‘All Science Concepts’ increased from 24% in 2002 to 35% in 2004.

Figure 21 reports the data in figure 20 by number of years teaching.

Figure 21
NMTC K-8 Science Content Standards Survey
Percent of Teachers Comfortable Teaching 75% or more of Science Content
in Content Areas by Number of Years Teaching*
(2002 and 2004)



*Please note that in 2002 16 teachers (14%) and in 2004 11 teachers (10%) did not indicate the number of years they have taught. These teachers have been excluded from the above figure.

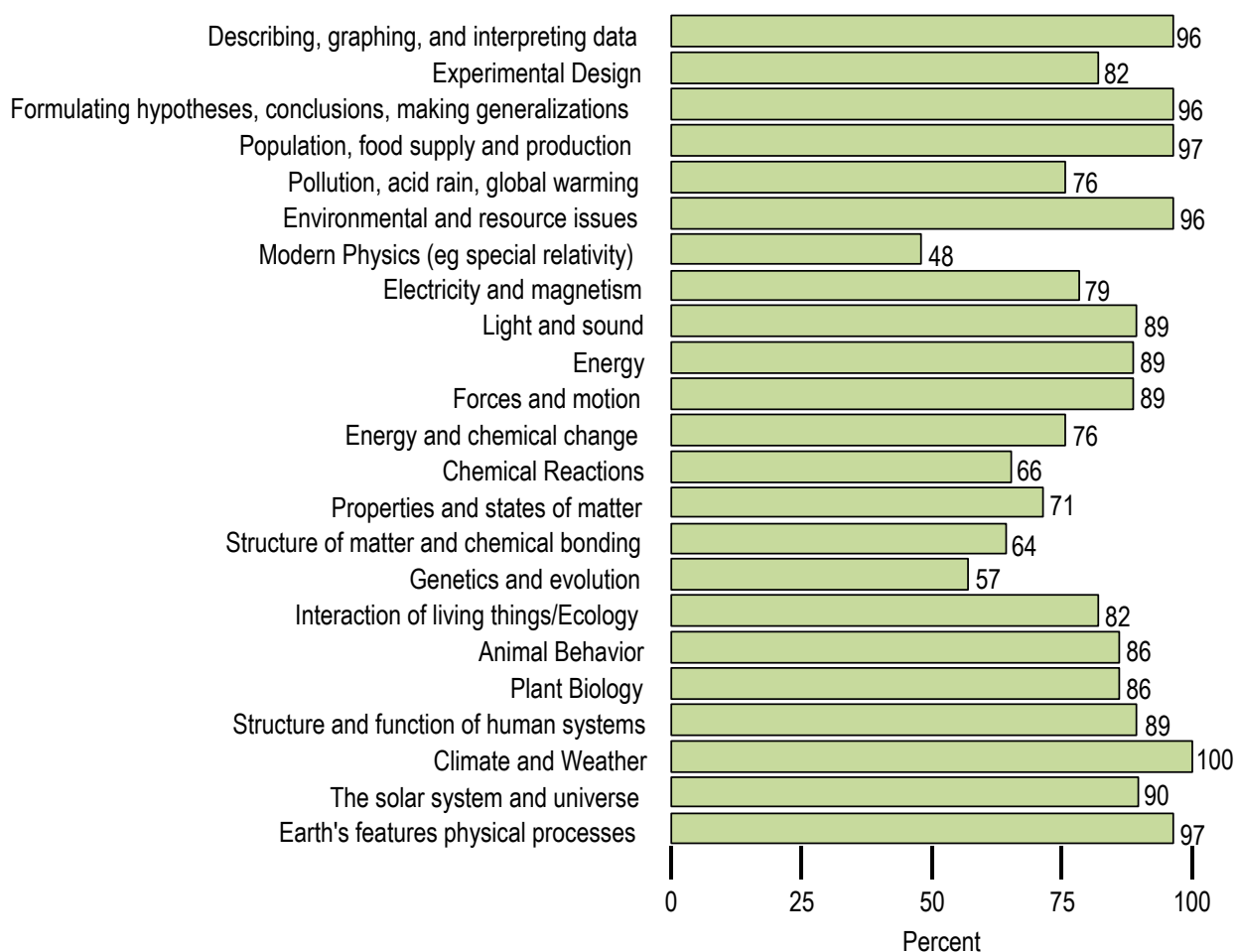
In two of the three reported science content areas, teachers with 7 to 15 years experience made more gains across the two years than the other groups. Across all reported content areas, teachers with 1 to 6 years experience made the least gains from 2002 to 2004. Teachers with 7 to 15 years experience gained the most across ‘All Science Concept’. In 2002, 33% of teachers with 7 to 15 years experience were comfortable with 75% of ‘All Science Concepts’ while in 2004, 54% of teachers (a 21 percentage point gain) were comfortable with 75% of ‘All Science Concepts’. The percent of teachers with more than 15 years experience comfortable with 75% of ‘All Science Concepts’ rose by 17 percentage points from 20% in 2002 to 37% in 2004. Lastly, the

percentage of teachers with 1 to 6 years of experience comfortable with 75% ‘All Science Concepts’ rose by 9 percentage points from 21% in 2002 to 30% in 2004.

2004 Teacher Pedagogy Survey

Figure 22 reports the percent of survey respondents who feel “adequately” or “very well” qualified to teach science topics.

Figure 22
NMTC Teacher 2004 Pedagogy Survey - Science
Percent of Teachers who Feel “Adequately” or “Very Well” Qualified to Teach Topics (N=29)

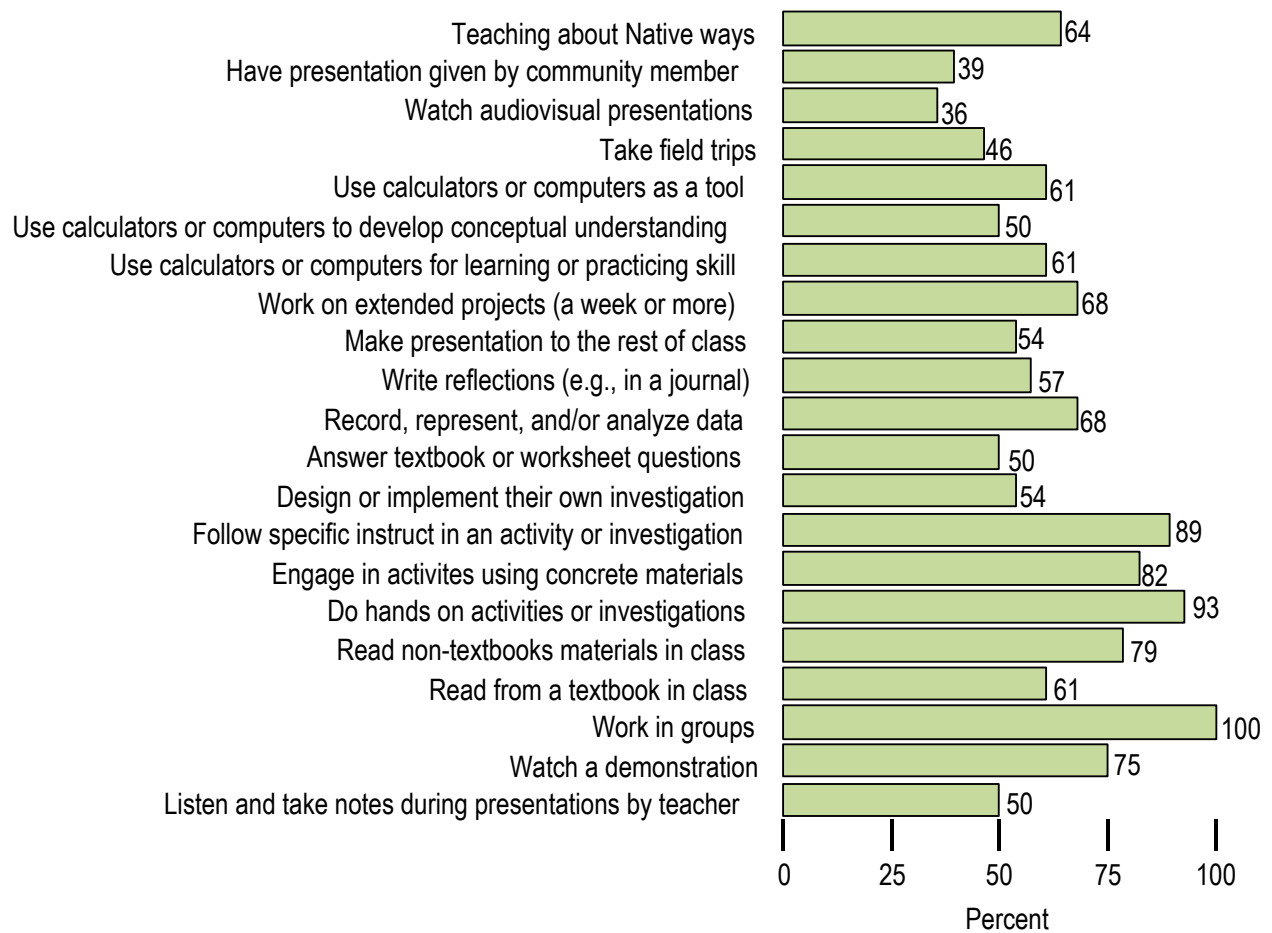


Two-thirds or less of teachers feel “adequately” or “very well” qualified to teach ‘Modern Physics (eg. special relativity)’ (48%); ‘Chemical Reactions’ (66%); ‘Structure of matter and chemical bonding’ (64%); and ‘Genetics and evolution’ (57%). On the other hand, 95% of surveyed teachers or more felt “adequately” or “very well” qualified to teach the following topics: ‘Describe hypotheses, conclusions, making generalization’ (96%); ‘Population, food supply and production’

(97%); ‘Environmental and resource issues’ (96%); ‘Climate and weather’ (100%); and ‘Earth’s features and physical processes’ (97%).

Figure 23 reports the percent of survey respondents who indicated that students in their classrooms take part in the following activities “frequently” or “almost always” in science.

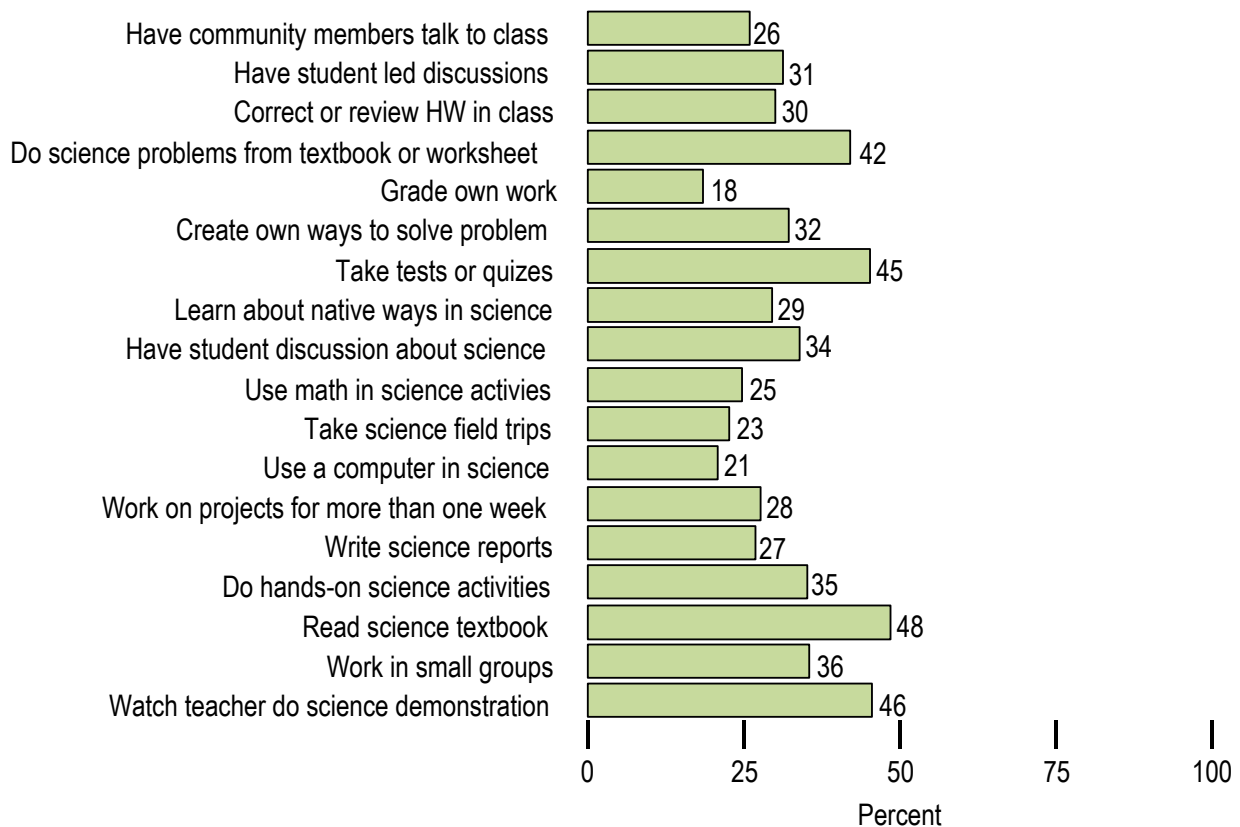
Figure 23
NMTC 2004 Teacher Pedagogy Survey - Science
Percent of Teachers who Report that their Students Take Part in Activity
“Frequently” or “Almost Always” (N=28)



Fifty percent or fewer of respondents indicated that their students “frequently” or “almost Always” ‘Have presentations given by community member’ (39%); ‘Watch audiovisual presentations’ (36%); ‘Take field trips’ (46%); ‘Use calculators or computers to develop conceptual understanding’ (50%); ‘Answer textbook or worksheet questions’ (50%); and ‘Listen and take notes during presentation by teacher’ (50%). Conversely, 85% or more of respondents reported that their students “frequently” or “almost always” take part in the following activities: ‘Follow specific instructions in an activity or investigation’ (89%); ‘Do hands on activities or investigation’ (93%); ‘Work in groups’ (100%).

Figure 24 reports the percent of student survey respondents in grades 3 to 6 self-contained classrooms who responded that they do activities “a lot” or “almost always” in science.

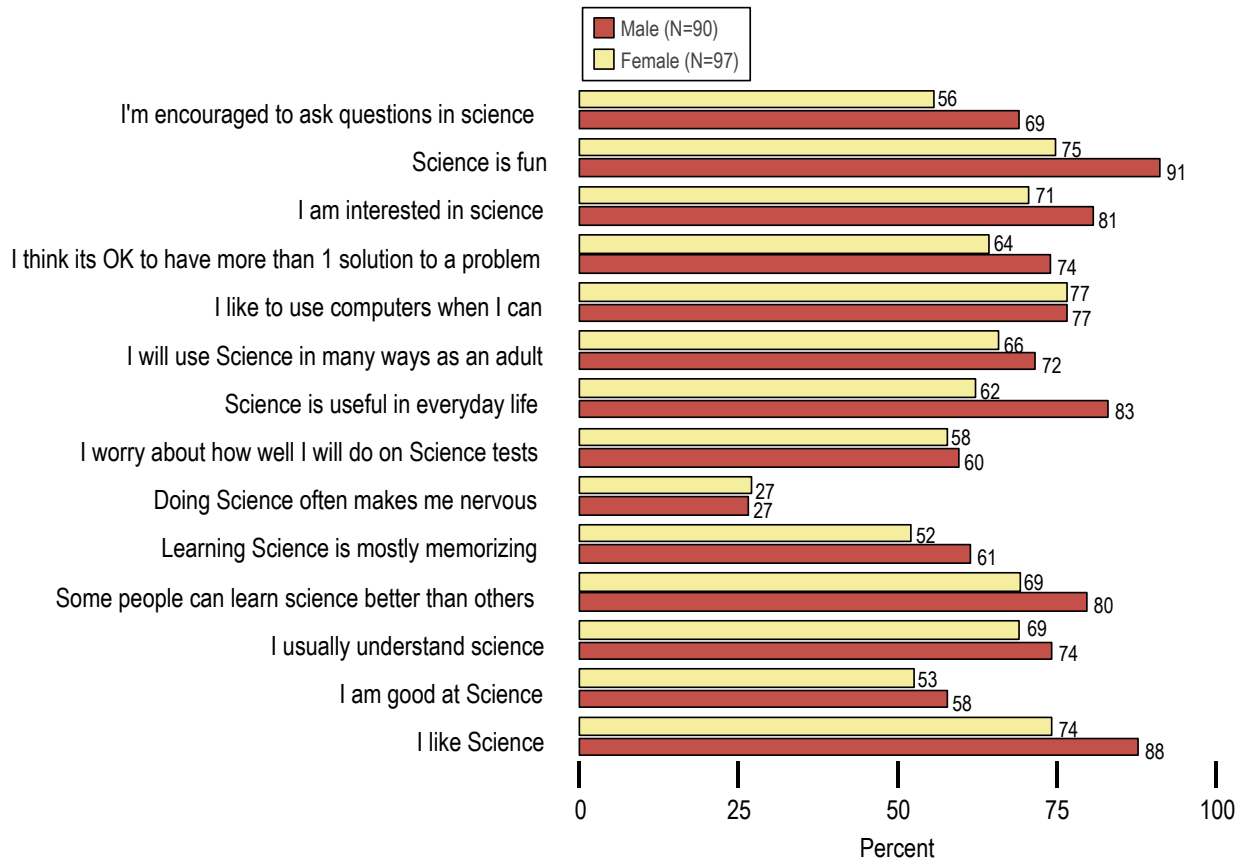
Figure 24
2004 Student Survey - Science
Percent of Grade 3, 4, 5, and 6 Students in Self-Contained Classrooms
who responded “A lot” or “Almost Always”
(N=239)



Across all activities, less than 50% of students reported they participate in activities in science “a lot” or “almost always”. Between 40% and 50% of responding students indicated doing the following activities “a lot” or “almost always”: ‘Do science problems from textbook or worksheet’ (42%); ‘Take tests or quizzes’ (45%); ‘Read science text books’ (48%); ‘Watch teacher do a science demonstration’ (46%). Less than 25% of responding students reported that they do the following activities “a lot” or “almost always”: ‘Grade own work’ (18%); ‘Use math in science activities’ (25%); ‘Take science field trips’ (23%); and ‘Use a computer in science’ (21%).

Figure 25 reports the percent of responding students in grades 3 to 6 from self-contained classrooms who “agree” or “strongly agree” with statements by gender.

Figure 25
2004 Student Survey - Science
Percent of Grade 3, 4, 5, and 6 Students in Self-Contained Classrooms
who “Agreed” or “Strongly Agreed” by Gender



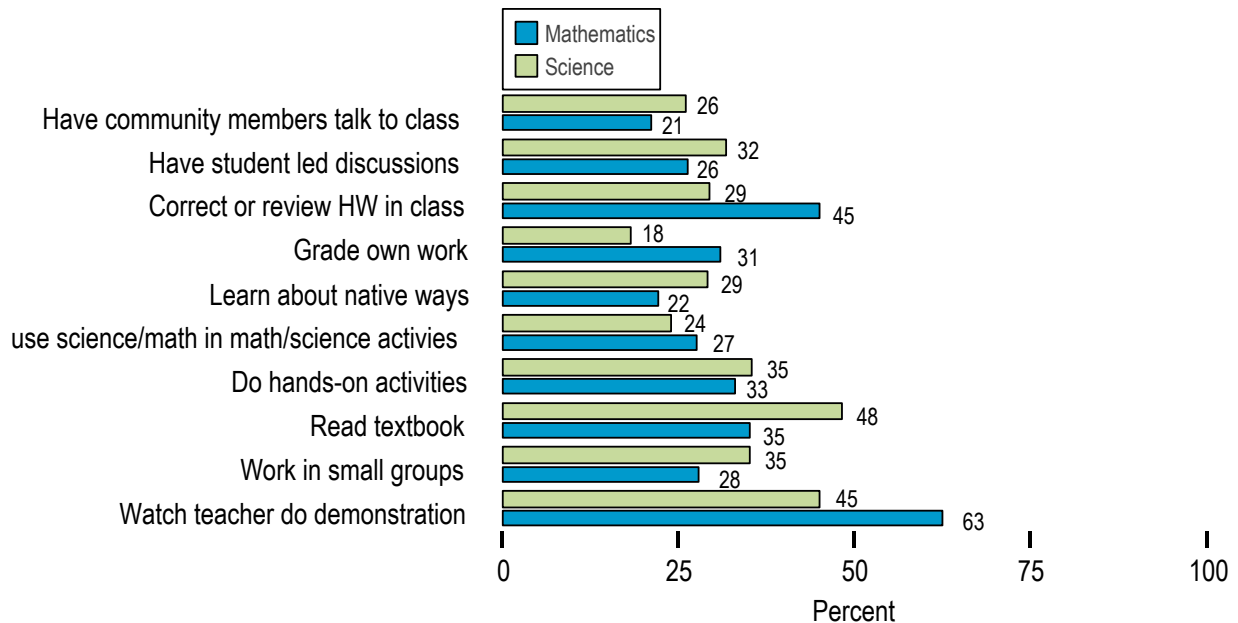
*Please note that 52 students (or 21%) who did not indicate their gender have been excluded from this graphic.

Male respondents “agree” or “strongly agree” at a higher rate than did female students on almost all statements. The percent of male respondents who “agree” or “strongly agree” with the following statements exceeded the percent of female respondents by 10% or more: ‘I’m encouraged to ask questions in science’ (male: 69%; female 56%); ‘Science is fun’ (male: 91%; female: 75%); ‘I am interested in science’ (male:81%; female: 71%); ‘Science is useful in everyday life’ (male: 83%; female: 62%); ‘Some people learn science better than others’ (male: 80%, female: 69%); and ‘I like Science’ (male: 88%; female: 74%).

Mathematics and Science – Student Surveys

Figure 26 reports the percent of students who responded “a lot” or “almost always” to selected statements about science and mathematics.

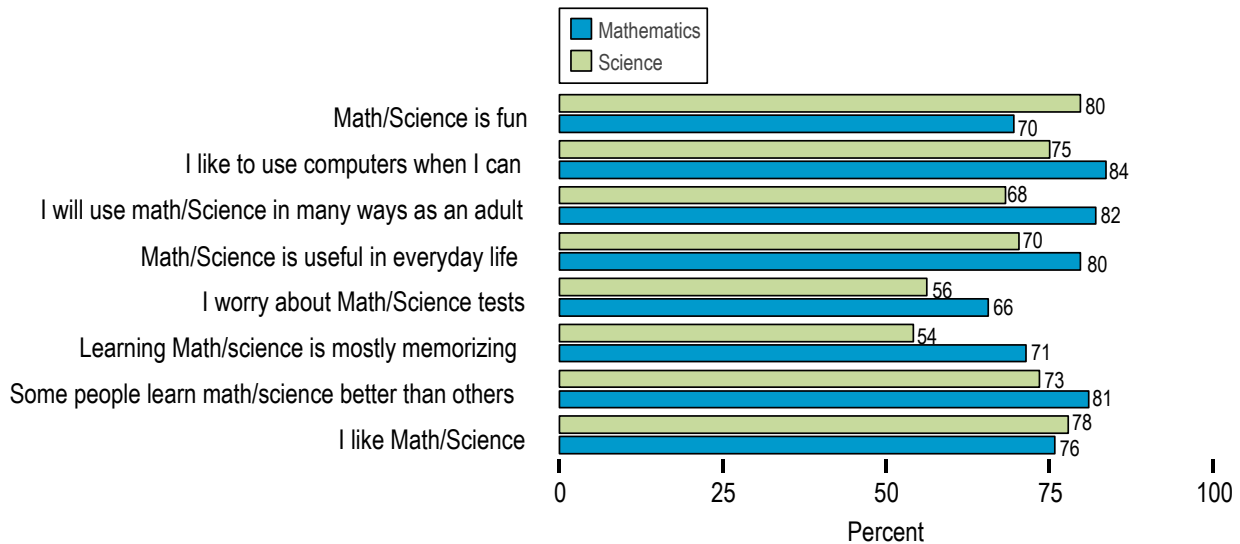
Figure 26
2004 Student Survey – Science and Mathematics
Percent of Grade 4, 5, and 6 Students in Self-Contained Classrooms
who responded “A lot” or “Almost Always”
(N=227)



Notably more student respondents reported they did the following activities “a lot” or “almost always” more often in science than mathematics: ‘Have student led discussions’ (science: 32%; mathematics: 26%); ‘Learn about native ways’ (science: 29%; mathematics: 22%) and ‘Read textbooks’ (science: 48%; mathematics: 35%). On the other hand, notably more students respondents indicated that they did the following activities “a lot” or “almost always” at higher rates in mathematics than science: ‘Correct or review HW in class’ (science: 29%; mathematics 45%); ‘Grade own work’ (science: 18%; mathematics: 31%); ‘Watch teacher do demonstration’ (science: 45%; mathematics:63%).

Figure 27 reports the percent of grade 4, 5, and 6 students who “agree” or “strongly agree” with statements in regards to mathematics and science.

Figure 27
2004 Student Survey – Science and Mathematics
Percent of Grade 4, 5, and 6 Students in Self-Contained Classrooms
who “Agree” or “Strongly Agree”
(N=227)



Student respondents “agree” or “strongly agree” more often with the following statement for science than mathematics: ‘Math/Science is fun’ (science: 80%; mathematics: 70%). Conversely, students respondents “agree” or “strongly agree” notably more often for mathematics than science that: ‘I like to use computers when I can’ (science: 75%; mathematics: 84%), ‘I will use math/science in many ways as an adult’ (science: 68%; mathematics: 82%), ‘Math/Science is useful in everyday life’ (science: 70%; mathematics: 80%); ‘I worry about Math/Science testes’ (science: 56%; mathematics: 66%), ‘Learning Math/Science is mostly memorizing’ (science: 54%; mathematics: 71%), and ‘Some people learn math/science better than others’ (science: 73%; mathematics: 81%).

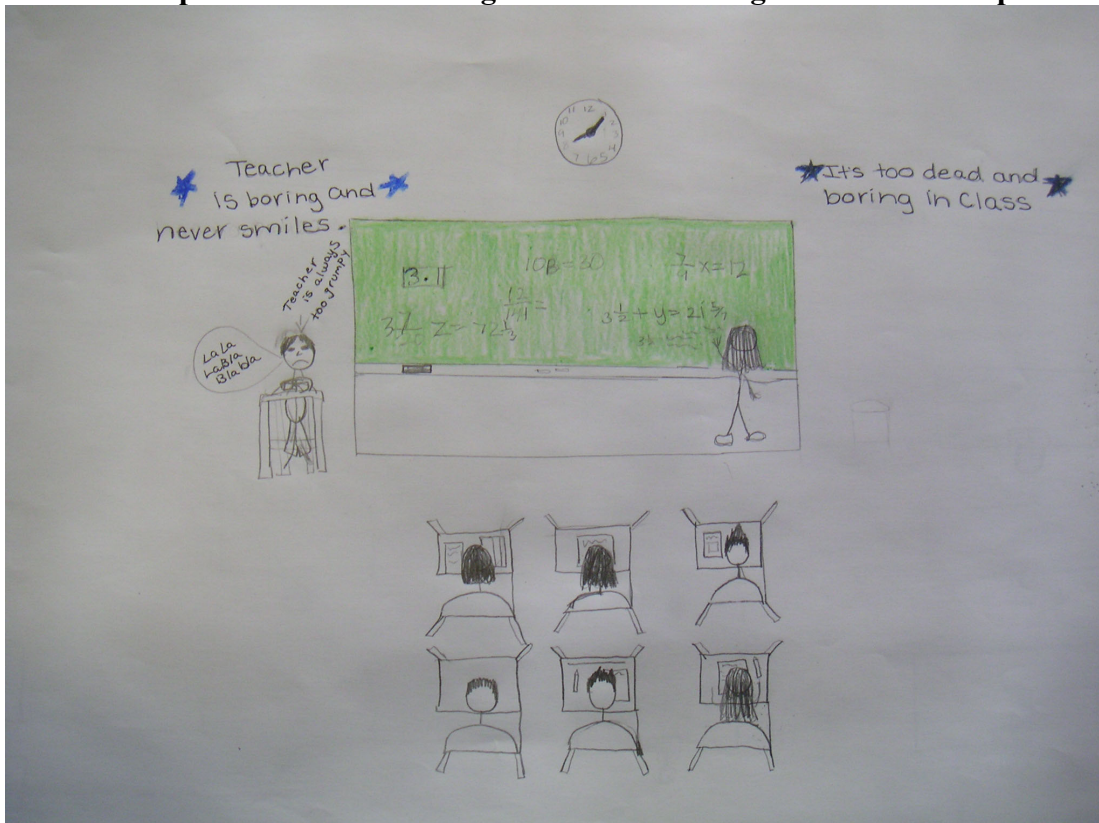
Pilot Student Focus Groups – November and December, 2004

Student feedback is extremely important to assessing the NMTC’s goal of positively impacting math and science education at NMTC schools. The NMTC conducted three pilot student focus groups during November and December of 2004 to gather data and evaluate a newly developed Student Focus Group protocol. Damian Webster and Kimball Sekaquaptewa, who are both Native, conducted the focus groups. In 2005, separate Student Focus Groups on mathematics and science using the newly developed protocol will be conducted at a number of NMTC schools.

During each of the pilot student focus groups, students discussed ‘what they do in math’, ‘how what they do in math connects to their tribe’, and ‘how they feel about math’. Discussions were supplemented by drawings on 16” X 25” sheets of paper that were intended to be a vehicle by which students could reflect on their sentiments prior to the group discussion.

The first pilot student focus group included 7 students (5 girls and 2 boys); all students were taking Algebra with 6 in one class and one in another class. Most of the students were in the eighth grade. Five of the students drew their classroom, which included students, the teacher and a chalkboard and supplemented their drawings with text: 2 students used only text. Figure 28 provides an example of a student drawing from this focus group:

Figure 28
Example of Student Drawing from 8th Grade Algebra Focus Group



During the focus group discussion of what student ‘do in math’, the moderators found that students had 55-minutes of math class and about 30 minutes of homework each day. Students reported their class structure and activities had fluctuated from having a lot of variety during the 2003-04 to having much less variety during the 2004-05 school year. According to the moderators, most students found that their current teacher is “boring and mean”, utilizes a traditional lecture/chalkboard format, and assigns questions out of the textbook without any use of computers, calculators, manipulatives, or group work. During the previous school year (2003-04), students reported having a teacher they preferred over their current teacher. Their 2003-04 class work included the use of Accelerated Math, stick manipulatives, group work and worksheets; the students also received candy incentives for their work. All students reported enjoying math, citing that “it makes you think”.

Students spent approximately 55 minutes each day in math class and reported that homework took them about 30 minutes each day. However, students could pay another student \$1.00 to do their homework for them. Students who live in the dormitory have access to tutoring services in the evening, while day students reported using calculators and even cell phones to help with math homework calculations. None of the day students had computers at their home.

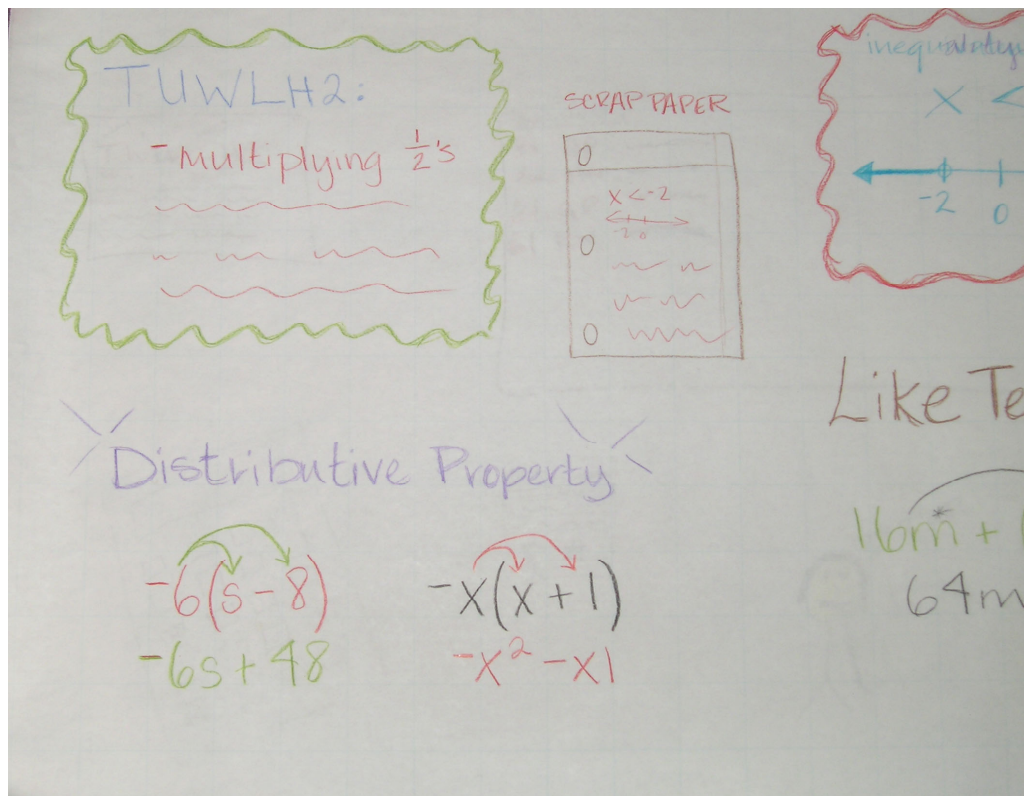
The students did not feel their teachers connected math to their tribal communities. However, when prompted by a measurement in tortilla-making example given by the moderators, one student changed his mind. Students reported that their parents encouraged them to do well in math because you can use math “everyday in everything”.

The group liked math and planned to take math courses at the college level. When asked what grades they receive, students were not shy about categorizing themselves into the following groups: 0 A’s, 3 B’s and 2 C’s; the moderators were unsure about 2 students’ responses. When asked about what helped them learn math, students who do well in math said they listen and do their homework, while students said they do not do well if the content is not explained or is only explained using one strategy.

11/11/04, 10th Grade Algebra Students

The second pilot student focus group included 3 female students in grade 10 taking the same Algebra class. This focus group was structured in the same way as the first. Students drawings reveal that the classroom is set up with rows of desks facing a blackboard from which the teacher lectures. All three students drew their classroom. Two of the three students drew someone in their class sleeping during lecture. Figure 29 provides an example of a student drawing from this pilot focus group.

Figure 29
Example of Student Drawing from 10th Grade Algebra Focus Group



The students reported that their daily class routine normally follows the following routine: warm-up problems; review/lecture (based on book); individual work on assignments or small group work with the teacher for struggling students. The group found their class easy because, according to a moderator, “if you didn’t understand the content you could go back for extra practice”. Moreover, students reported that they like the

step-by-step process and patience employed by their teacher and the tricks she showed them (though they couldn't remember one example of a trick well enough to explain it to the moderator).

Students receive about 30 minutes of homework each school day with no homework assigned for the weekends, though students only have class every other day. Homework most often consisted of assignments from the book; recently worksheets have been assigned as well. Also emphasized by the focus group was the teacher's homework policy, which allowed homework to be turned in late for credit.

Students had used hands-on methods in math class, specifically manipulatives, a couple of times. However, students did not completely comprehend how to use the manipulatives and "preferred the old style". When asked about 'What helps you learn', the focus group cited their teacher's demonstrations of ways to check their work and the use of multiple approaches within lectures.

The students used calculators in class (two drew calculators in their drawing). While there was a computer in the classroom (drawn by one student), the group reported that it was never used. Students expressed interest in using computers more in mathematics for "something different".

As with the first focus group, students did not readily identify ways in which their teacher connected mathematics to their tribe. The one example they heard teachers using was measuring in cooking traditional foods. Importantly, one student pointed out that traditional cooking does not use measuring apparatuses.

The focus group participants reported that their parents encouraged their participation in math for personal growth and because "math is in everything". Students' career interests including computer design and pediatrics; one student wasn't sure what she wanted to do in terms of a career. Overall, students liked math except for some challenging concepts including fractions, integers, and negatives; despite these obstacles, one moderator reported that students "seemed to accept that they just had to stick through it".

When asked about changes that could be made to make learning math more helpful, students weren't sure of what could be done. While they mentioned that they appreciated how their teacher helped them stay organized by checking agendas and teaching them tricks, they also expressed interest in doing math problems on the board in order to learn from one another's mistakes. When asked about group work, students didn't feel it would be helpful because one person would know the answer and the rest would copy it.

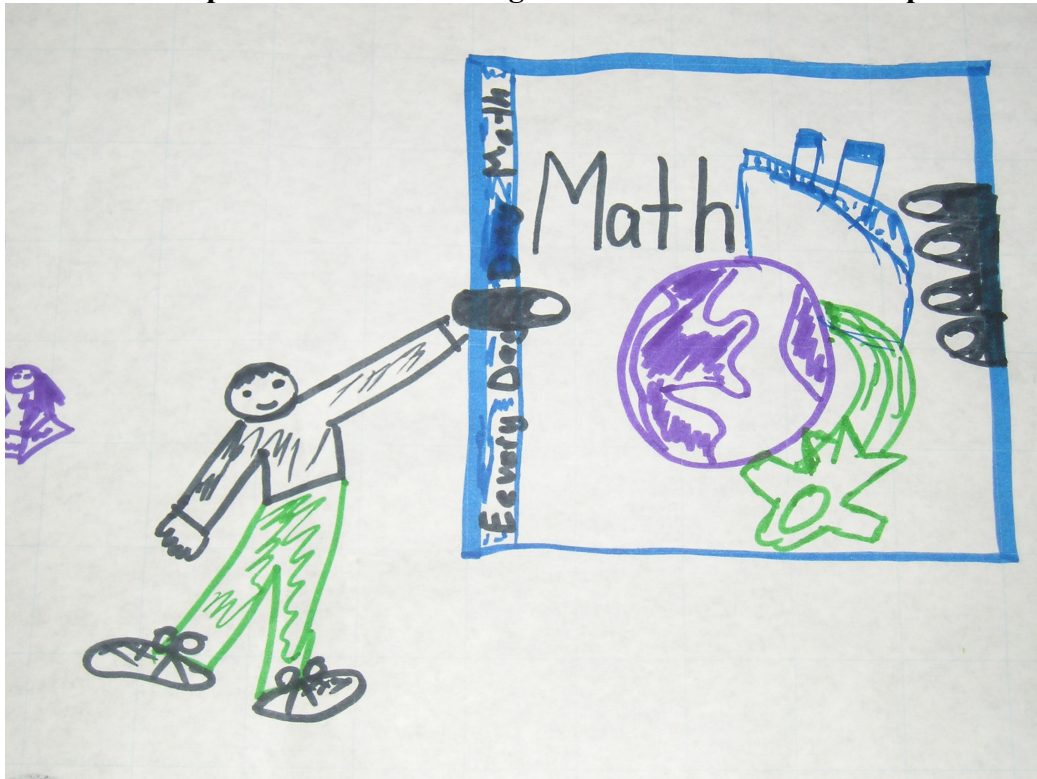
12/9/04, 4th Grade self-contained classroom students

On December 9th, 2004, the first pilot student focus group with elementary school students was conducted. Eight grade 4 students from the same classroom participated in this group; of those eight students all except one were from the same Pueblo and had attended the school in 2003-04. The remaining student was from another Pueblo. Both moderators reported that the students were enthusiastic about participating in the focus groups; snacks and drinks were served to students, which may have contributed to increasing their comfort levels.

All students readily involved themselves in drawing during the focus group. Only two students drew physical school rooms: one drew a computer lab and the other supplemented a drawing of the classroom with more abstract portrayals of math. Compared to the first two focus groups, drawings from this group of 4th graders were more abstract and varied more from student to student. Two similarities across the students were the drawing of multiplication tables, which students are currently working on in the classroom (5 students) and the drawing of an unknown symbol or perhaps a key on a device they use in their classroom: a circle with a diagonal line through the circle and a division sign within the circle (6 students). Students were encouraged to incorporate examples from their community life (and were promised a prize from the moderators for doing so). Some examples from the drawings of connections to community life included collection/disposal of garbage,

drumming and dancing, baking bread, and counting homes. Figure 30 is a sample drawing from this focus group.

Figure 30
Example of Student Drawing from 4th Grade Focus Group



Students' drawings and their focus group discussion reveal that a variety of instructional methods are being utilized in their classroom including: Accelerated Math (computers), Playstation math games, text books, cards games in group work, a multiplication baseball game, multiplication using the “finger trip” for multiplying by 9, multiplication tables, and other strategies such as drawing rows and columns of dots and counting them to multiply. Student utilized calculators, but only “when the book says so”. When asked to choose their favorite activity given 3 choices, 4 students preferred Accelerated Math, 3 preferred Playstation, and 1 preferred their math book. All students also stated that their teacher was “mean and strict, but not all the time”. When asked if ‘her strictness made them do their work’, students replied that yes, it helped.

While most students reported that they like math, one student loved it, and a few did not like it. Overall, students liked addition more than multiplication and division. Students received homework on 2 or 3 subjects each evening, with 10 to 15 minutes of work per subject. It was not reported how many days each week they receive math homework. Half the students stated that their parents help them with their homework when they needed assistance.

The students found that their current teacher does not use examples from their Pueblo or other tribes in math, although their 3rd grade teacher did. However, the moderators found that the 4th grade students more quickly connected math to their community than older students. One moderator noted that students appeared to define math simply as “counting”. Examples of math in community life given by students included counting in dancing and singing, counting apples in farming, counting homes for planning purposes, counting papers in an office job, jumping rope, and collecting trash.

Students' parents stressed to them that math is important to getting a good education, doing better on tests, and getting a better job. When students were asked how they can use math to help their families, their responses included teaching drumming/dancing, helping aging parents tell time, and by informing parents of new "math symbols" (ie. those on computer keyboards). Students first mentioned counting in factories or at Wal-Mart when asked to 'daydream future careers' that use math.

The pilot Student Focus Groups reveal that despite some students being exposed to teaching styles that they did not find helpful to their learning, the vast majority of participating students and their parents like math and place value on learning and succeeding in math. The grade 10 Algebra students reported that staying organized, having structure, and teacher patience helped them learn; they were interested in implementing computer usage and students doing examples on the board to further increase their learning. The grade 8 Algebra students, enjoyed their 2003-04 class which incorporated Accelerated Math, stick manipulatives, group work and worksheets while they were bored by their current teacher's lectures. The 4th grade students are currently utilizing a large number of resources to help them learn; when given 3 choices, the most preferred resource was Accelerated Math followed by Playstation.

In general, the two focus groups with 8th and 10th grade students portrayed more what they do in math, what they like/dislike about math, and how math connects to their community life within their drawings in a more literal, concrete manner than did the younger students. While the majority of older students drew their classrooms with rows of desks, students, and teachers, the majority of the younger students used a variety of images not related to the physical classroom. The younger students also more readily incorporated their community life into their drawings. It is possible that this difference between students is a result of the elementary classroom's being self-contained, integrating across disciplines more, and using a variety of activities while the older students are presented with more traditional instructional strategies and less integration and variety.

When further data is compiled by conducting more Student Focus Groups in 2005, we will be able to analyze students' perceptions of math and success in math related to content, instructional strategies, the inclusion of Native Ways and more. The NMTC also intends to conduct Student Focus Groups in science, which will provide similar data about students' perceptions of science in NMTC schools.

Principal Feedback regarding Standards Based Curriculum Implementation

The four principal questionnaires reveal that respondents found that standards based curriculum implementation is heading in a positive direction, but still needs additional attention. Ratings included 1 "poor" and 3 "satisfactory". One principal mentioned that "we are getting pretty good, but have a ways to go". Another wrote about upcoming plans stating, "Plans to work on curriculum are being developed for this summer. Many staff members have different ideas of what and how we should proceed".

Leadership Institutes

During 2002-03, the Summer Leadership Institutes were co-sponsored by COOL and NMTC and explored the evaluation of teaching practice. Staff evaluations at Pueblo schools are not regularly conducted by school leaders, in many circumstance due to time constraints. MST School Leaders designed a self-evaluation/peer evaluation form to be used in addition to staff evaluations conducted by principals. The COOL participants further modified this evaluation form in their "Supervision and Evaluation" course based on their learning regarding current evaluation research. The form is continuing to be modified and adapted during Year 3.

Principal Feedback regarding Leadership Institutes

One principal rated the Leadership Institutes as “satisfactory” while 3 ratings of “good” were given. Principals mentioned that they enjoyed the Leadership Institutes and found them helpful. One principal stated that “(Our) staff as a whole attended a leadership training during this school year more than once”. Another comment was that on-site implementation of knowledge obtained at the Leadership Institutes needs to be addressed further.

School Reform Rallies

School Reform Rallies, held once a year to provide professional development opportunities, are sponsored by NMTC, SFIS, COOL and CENAC. Attendees include all school staff members (principals, teachers, and support staff) of the NMTC schools. The 2002 School Reform Rally, “Understanding Students and Utilizing Native Knowledge” involved 450 educators. In January 2003, the School Reform Rally theme was “Leaders for a Culture of Change” and focused on hands-on math and science as well as integrating technology and brain compatible teaching strategies. In 2003, 427 attendees were present at the school reform rally. In 2004, the rally, entitled “Transition Through Technology”, provided attendees with training in utilizing technology to assist and strengthen classroom teaching, assessment, record keeping, and other areas of impacting schools and students. Focus was also placed on assisting student with transitioning across grades and schools. There were an estimated 400 participants at the 2004 rally.

School Reform Rallies begin with an open session for all attendees. This open session is followed by workshop sessions of 20-40 participants addressing different topics. For example, during the 2004 rally, topics included Native Science Curriculum, The Dance of Change, Graphic Organizers, Spatial Sense, Increase Students’ Mental Health, The Move to Real Reform Through Community-School Partnership, Navajo Peacemaking Process, It’s All About the Test, and Bridging Cultures. Workshops are held on both Friday and Saturday and are led by MST Leaders, community members, and other individuals with relevant knowledge.

The 2004 CENAC Rally Participant Evaluation Report indicates that teachers, student living advisors, food service personnel, counselors, bus drivers, teacher assistants, special education personnel, librarians, and more returned 228 general rally evaluations. All categories regarding the rally overall had a mean score of 3.0 (“somewhat”) or better on a 5 point scale. Among the most highly rated components were the organization of the rally (4.3), presentation of information applicable to working with students (4.2) and interesting and effective delivery of information (4.2). The lowest rated rally components included improving content knowledge of math and science (3.6), including an assessment component to use in the classroom (3.6) and improving ability to implement standards in the classroom (3.7).

Responses to an open-ended question, “What did you find most useful about this rally?” included 81 responses of a specific workshop, 24 of practical, hands-on classroom strategies, 22 of networking and sharing information, and 18 of the bus driver training regarding federal law changes. Suggestions for improvement of the rally included 43 general, positive comments such as “Keep it up!” while food not being provided to participants was a concern for 39 people. Twenty-five people suggested a greater variety of workshops that corresponded with their specific job (dorm, kitchen, counseling, psychology, library, etc) and 14 people noted technical problems would be lessened by the presence of a technical staff member at the rally.

Teacher Interviews’ Feedback Regarding School Reform Rallies - November 2004

The CENAC Rally was mentioned by a number of participants during interviews. Five respondent rated the CENAC Rally on a scale of 1 to 10, giving it 2 “7s”, 1 “8”, 1 “9” and 1 “10”. As previously noted, only 1 respondent felt that the CENAC Rally was not helpful while overall ratings reveal that this event was mostly

popular with the remaining respondents. One teacher commented that the location and MST Leaders’ role influenced perceptions of the Rally: “One year the Rally was held in a hotel and it looked like a ‘real conference’ and the MST gave presentations which really showed their expertise. The next year it was held at SFIS and there were lots of gripes about the location, travel time, and comp time. There were no MST lead trainings either when there should be a place for MST Leaders to do presentations at the CENAC Rally”. Another teacher found that “Some things did not seem applicable. I think designers of the Rally need to speak with teachers more about their needs”. On the other hand, one teacher found that she was able to apply things she learned at the Rally in her classroom the next Monday. Recommendations for improvement included allowing for follow-up training on interesting topics, excluding presentations where people are trying to “sell a product”, and making sure all sessions are applicable to teaching.

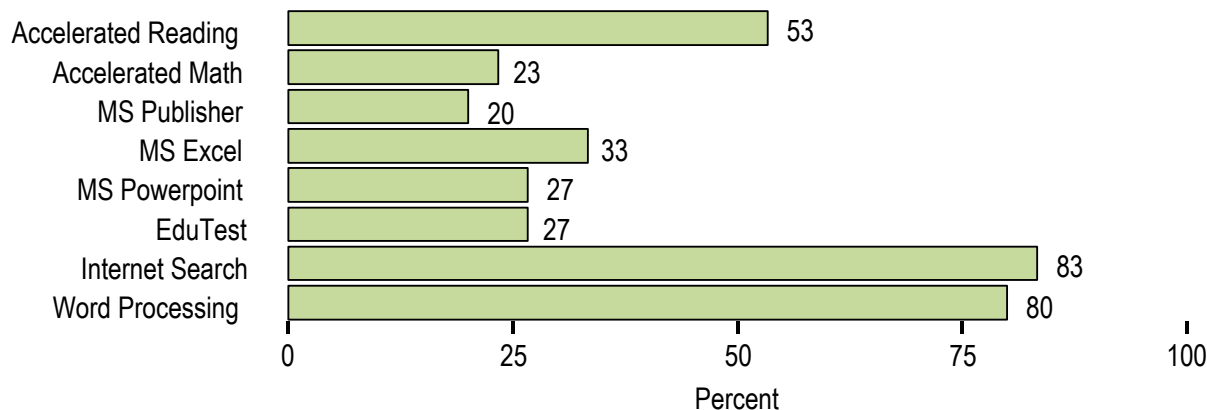
Principal Feedback Regarding School Reform Rallies

The four principal questionnaires contained 1 rating of “satisfactory”, 2 ratings of “good” and 1 rating of “excellent” for the School Reform Rallies. Principal comments included a praise of the learning and team building at School Reform Rallies, “It is a great learning activity for staff and a great day for the staffs of all schools to get together”. One principal suggested that, “(School Reform Rallies) need to be evaluated on how it is being used in the classrooms”.

Enhancing Education through Technology

Figure 31 reports the percent of 2004 Teacher Pedagogy Survey respondents who indicated using selected technology tools once a week or more.

Figure 31
Percent of Teachers Utilizing Selected Technology Tool Once a Week or more
(N=30)



The technology tools most commonly used on a regular basis among survey respondents included ‘Internet Search’ (83%) and ‘Word Processing’ (80%). The technology tools least used by survey respondents on a regular basis included ‘MS Publisher’ (20%), ‘Accelerated Math’ (23%), ‘MS Powerpoint’ (27%), and EduTest (27%).

Principal Feedback Regarding Computer based Assessments (EduTest)

Principal questionnaires indicate that principals have found that teachers need additional training to most effectively utilize EduTest. Comments regarding the need for additional training included two comments relating that teachers need more computer skills to use EduTest. One rating of “poor” was given along with 3 ratings of “satisfactory”. Three of the four schools represented had been utilizing EduTest, the remaining principal stated that their school had not yet implemented EduTest, but intends to do so next year as “up to date” computers have recently been purchased for each class.

Science Fair

In 2004, CENAC Science Fairs were held at T’siya Elementary School on January 13, 2004 for grades K-4 and at SFIS on January 15, 2004 for grades 5-8. More than 350 students in grades K-8 participated in the Science Fairs with a total of more than 250 science projects. Judges arrived in the morning for an hour and a half orientation. After the judging of student projects, the judges met to determine awards. An awards ceremony was held during the late afternoon. Projects were rated and scored based on their use of a scientific approach, skills, creativity, clarity, thoroughness and teamwork (where applicable). Additionally, students in grades 5-8 were judged on their project abstract, research, journal/documentation and bibliography.

One of NMTC’s major emphases at the Science Fair was on culturally-based projects. A separate award category, The Native Science Award, was judged based upon three categories: integration of cultural traditions and western science and technology, traditions (adherence to cultural heritage, knowledge gained in traditional ways/through cultural teachings), and self-reflection.

Student Projects – Kindergarten to 4th Grade

The K-4th grade Science Fair projects were classified by grade level. Figure 32 reports number of projects, number of schools participating, and percent of projects that were culturally-based projects by grade level for Kindergarten to 4th Grade Science Fair projects.

Figure 32
K-4 Student Projects

Science Fair Projects’ Grade Levels, Number of Projects, Number of Schools Participating & Percent of Projects that were Culturally-Based Projects

Grade	Number of Projects	Number of Schools Participating	Culturally-based?
Kindergarten	12	6	8%
1 st Grade	31	10	10%
2 nd Grade	31	10	7%
3 rd Grade	35	11	9%
4 th Grade	31	11	7%
OVERALL	140	11	8%

The least number of Science Fair projects were submitted by Kindergarteners (12) as one would expect while there were more than 30 projects submitted for each of the remaining grades. Similarly, the least number of schools (6) participated at the Kindergarten grade level; 11 schools (100% of possible schools) participated in 3rd and 4th Grade representing all eligible schools. It is important to note that data collection challenges

prevented the recording of whether or not many projects were culturally-based, hence data on the percent of projects that are culturally-based should be interpreted cautiously. More than 7% of all projects by grade level were culturally-based despite the large amount of missing data. It is very likely that the actual percentages of projects that are culturally based are even higher than 7%.

Examples of project titles for Kindergarteners included “The Floating Egg”, “Hot Colors” and “Native American Kinders Fight Against Diabetes” (culturally-based). Science Fair titles for 1st grade included: “How does Bread Mold”, “Traditional Pottery” (culturally-based) and “Which Handsoap is the Best”. Second Graders used titles such as “An Egg Without a Shell”, “The Use of Yucca Plants” (culturally-based) and “How to Make Playdough”. Some 3rd Grade titles were “The Heart as a Pump”, “Natural or Not” (culturally-based), and “Ground Contamination”. Lastly, topics among 4th Graders included “What Cleans Silver Best” (culturally-based), “Free Energy From the Sun”, and “Construct a Circuit”.

Student Projects – 5th Grade to 8th Grade

The 5th to 8th grade Science Fair projects were classified by subject area. Figure 33 reports number of projects, number of schools participating, and percent of projects that were culturally-based projects by subject area for Grade 5 to 8 Science Fair projects.

Figure 33
5-8 Student Projects
Science Fair Projects’ Subject, Number of Projects, Number of Schools Participating & Percent of Projects that were Culturally-Based Projects

Subject	Number of Projects	Number of Schools Participating	Culturally-based?
Behavioral/Social Science	16	6	13%
Botany	12	4	33%
Chemistry/ Bio-Chemistry	21	9	10%
Computer Science	1	1	0%
Earth Science	16	5	31%
Engineering	6	4	33%
Environmental Science	13	6	23%
Medical/Health	13	6	15%
Microbiology	2	2	0%
Physics	16	8	0%
Zoology	6	3	17%
Team Project	13	4	39%
Overall			19%

The 4 subjects with the most Grade 5-8 Science Fair participants were Chemistry, Behavioral/Social Science, Earth Science and Physics. Only 1 or 2 students entered Bio-Chemistry, Computer Science and Microbiology Projects. The most schools participated in Chemistry, Behavioral/Social Science, Environmental Science, Medical/Health, and Physics projects. As with Grades K-4 projects, it is important to note that data collection challenges prevented the recording of whether or not many projects were culturally-based, hence data on the percent of projects that are culturally-based should be interpreted cautiously. More than one-third (39%) of the Team Projects were culturally-based, along with one-third (33%) of the Botany and Engineering projects.

Nearly one-third (31%) of Earth Science projects were culturally-based as well. It is very likely that the actual percentages of projects that are culturally-based are even higher given the missing data.

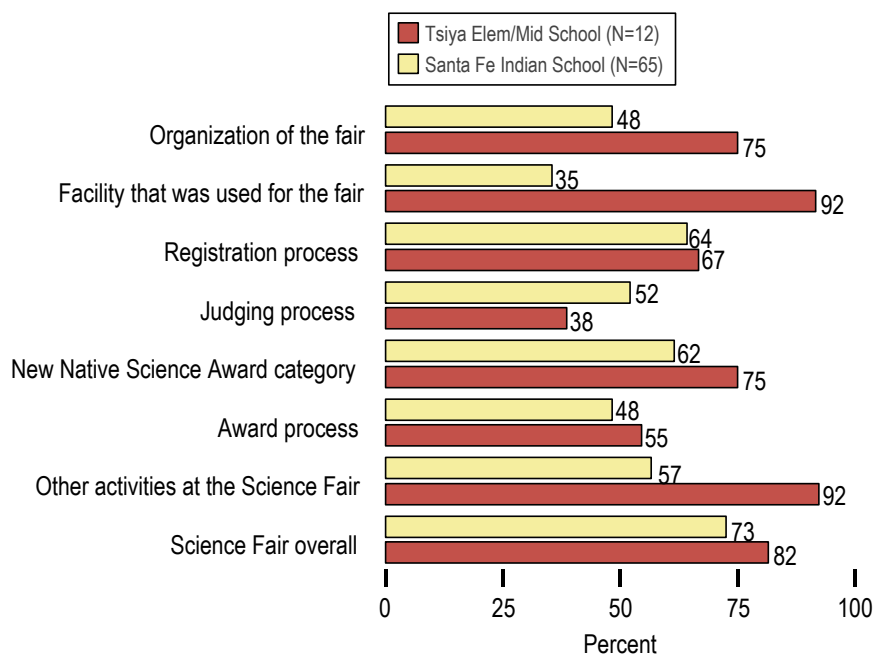
Examples of some project titles done by Grade 5 to 8 students are: “What Wood Makes the Strongest Bow” (culturally-based), “Caffeine’s Effect on Memory”, “How Does Piki Derive Its Color” (culturally-based), “Thermal Currents”, “Acid Rain”, “Curing Eczema Using Modern or Traditional Medicine” (culturally-based), “How to Make Your Own Flashlight”, and “Cabbage Chemistry”.

Survey of Science Fair Attendees (Students, Teachers, and Parents)

In order to evaluate the successes of the Science Fairs as well as areas that could be improved upon for the following year, surveys were distributed to students and teachers who attended the Science Fairs at both schools. A few parents also completed surveys that were designed for students or teachers. This section documents the findings from the Science Fair evaluation surveys taken by students, teachers and parents.

Figure 34 reports the percent of survey respondents (students, teachers and parents) who rated the fair components as “good” or “excellent” by location.

Figure 34
Percent of Attendees Rating Fair Components as
“Good” or “Excellent” by Fair Location



Seventy-five percent or more of attendees at the T’siya Fair rated the following categories as “good” or “excellent”: ‘Facility that was used for the fair’ (92%); ‘Other activities at the Science Fair’ (hands-on science, inventions convention, SFIS tour, etc.) (92%); ‘Science Fair overall’ (82%); ‘New Native Science Award category’ (75%); and ‘Organization of the fair’ (75%). On all categories except ‘Judging process’, SFIS Fair survey respondents rated fair components less positively than did respondents from T’siya Fair. The most notable variation in responses were in ‘Organization of the fair’ (T’siya: 75%; S.F.I.S.: 48%), ‘Facility that was

used for the fair' (T'siya: 92%; S.F.I.S.: 35%), and 'Other activities at the Science Fair' (hands-on science, inventions convention, SFIS tour, etc.) (T'siya: 92%; S.F.I.S.: 57%).

Science Fair attendees who completed surveys were asked in an open-ended question, "What are your feelings about the new 'Native Science Award' category?" Responses were overwhelmingly positive. One student responded, "I think the Native Science Award was great because I got to see what Science Fair projects were related to Native American ways." Another student noted, "It was good because it gives us a chance to express our Native culture." One student commented on his/her learning because of the Native Science Award: "I didn't know about the different types of clay and now I know." Survey respondents were also asked to comment on their feeling about the use of categories and grade levels in the judging process. Many of the responses to this question were positive. However, a number of recommendations were included. The two most common recommendations follow: "I think they could get more judges and that way it would be faster" and "I feel that you should have had us compete with only 6th with 6th and 7th with 7th and so forth".

Lastly, attendees who completed surveys were asked "What suggestions can you give to improve the Science Fair for next year?" For respondents from the T'siya Fair, the most common recommendation from students, teachers, and parents attending the Science Fair was to increase the number of judges. SFIS Fair respondents recommended letting students have time to look at one another's projects, increasing the number of judges, and having more chairs as well as a snack bar. Some people suggested that the Science Fair be held at another location as they felt the overall space at the SFIS was too small to accommodate the event.

Surveys of Science Fair Judges

Judges surveyed were asked to respond to a number of open-ended questions regarding the Science Fair and their role/assessment therein. When asked, "What did you find most useful about the judges' orientation?", two judges gave the following replies: "I thought it was very well presented; especially for judges who were new to the process" and "Gave insight on how to treat students and (provide) encouragement". Judges were also asked for suggestions as to how to improve the judges' orientation. Two judges recommended that a "cheat sheet" be preprinted for all judges. One of those two judges noted that this was done at SFIS after being suggested at T'siya. Another recommendation was, "Make sure judges have background in the sciences, stress the importance of competition for these students to go further in the science fair process". One judge felt that refreshments were necessary (as did some teachers and parents).

Surveyed judges also provided recommendations regarding the Native categories. One judge mentioned, "Criterion established for native categories, constructs. This process will help the teachers guide students at the local level. Can we help you in the process?" Another judge stated that the Native categories were "a great experience for the children". But also added "most children prepared their exhibit for a Western Science category and were unprepared to articulate their experience as a native person. They could use some guidance from their teachers". Another judge commented, "With the Native Science category I thought the questions and basis for criteria were too broad. It was very difficult to judge and rate the native projects based on the judges form." Judges were also invited to list any other comments; responses to this question included: "I enjoyed judging – each child taught me something new. There are several kids that touched my heart." and "I really think it is important to make sure judges have some knowledge of basic science concepts. It makes a difference during the interview process, so students get full benefits of interactions."

Principal Feedback Regarding Science Fair

The 4 principal questionnaires included 1 rating of "fair", 2 ratings of "satisfactory" and 1 rating of "excellent" for the Science Fair. One principal commented that establishing a Science Fair Committee was very useful and

another mentioned that the NMTC staff did a great job. Another principal stated that “(I) heard too many complaints that our students didn’t participate in upper level competition. At the local level many students participated”.

Data Management Tools

Kimball Sekaquaptewa, Project Director for the CENAC Enhancing Education Through Technology grant, and Kirk Minnick of Minnick & Associates, Inc. have been working with school principals and NMTC personnel to gather and disseminate data on student attainment. Student attainment data has been collected, analyzed (based on New Mexico’s No Child Left Behind ratings), and reported back to the schools. Kimball and Kirk also provided CENAC principals with Microsoft Excel Training on May 7, 2004 and June 21, 2004. The Microsoft Excel Training was geared at increasing principals’ and schools’ data management and assessment skills. Additionally, NMTC’s database provides extensive data on teachers’ backgrounds, professional development activities, and school roles; professional development activities; individual school backgrounds and enrollment; and other pertinent data. While data collection has been a focus for NMTC, challenges exist in ensuring that data is captured in a consistent and accurate manner.

Consolidated School Reform Plan (CSRP) Support

Mandates created in January of 2002 required BIA schools to create a five-year plan for school improvement, called the Consolidated School Reform Plan (CSRP). NMTC facilitated the alignment of all of the requirements of the various overseeing agencies in order to assist schools with developing one school master plan for improvement. The first CSRP, created in 1995, was developed with the assistance of outside consultants. However, in February 2002, the CENAC principals decided that they wanted to create their own reform plans at their school sites. NMTC offered to provide assistance in developing and training Leadership Teams for each school site. In 2002, NMTC held Data Retreats for 9 different schools in order to assist them with knowing what data to collect, how to analyze it, and what to do to improve. In 2003, NMTC held 2 data retreats and 1 meeting for a single school. It appears that there were no CSRP related trainings and/or retreats held in 2004.

Section 2: Policy Changes (Driver 2)

NMTC second driver aims to “Develop a coherent, consistent set of policies that supports provisions of broad-based reform of mathematics and science at the K-12 level.” A critical element in policy change is the shared governance of NMTC schools through CENAC: for example, at each month’s CENAC meeting the principal of the host school is responsible for preparing and planning the agenda, chairing the meetings, and keeping minutes. Educational policy development across the 12 schools is critical to improved performance. In spring of 2003, 11 out of the 12 schools were placed under School Improvement status for having failed to meet Adequate Yearly Progress, as defined by the BIA. Schools’ immediate responses to School Improvement status have varied. One notable solution was the formation of Governance meetings at SFIS. These Governance meetings aim to ensure that tribal sovereignty is maintained throughout the 12 schools within their policies and procedures. Moreover, Governance meetings aspire to increase involvement of tribes in creating educational policies, particularly those affecting mathematics and science. In addition to Governance meetings, policy changes involve the additional components listed in Figure 35.

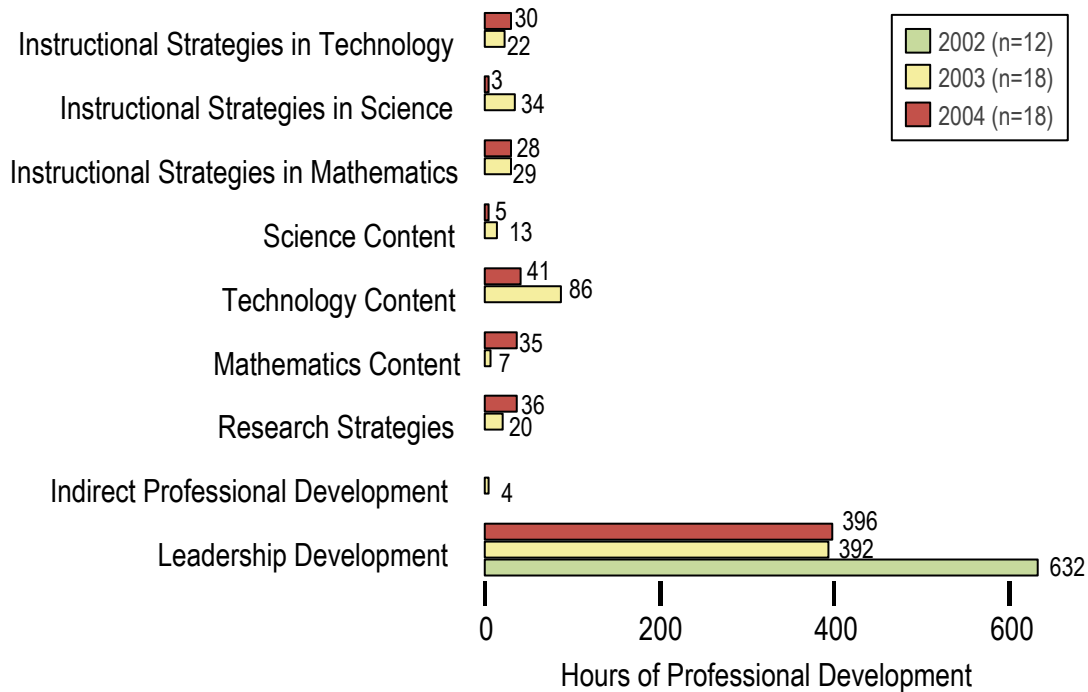
Figure 35
Driver II Components

1. CENAC Monthly Meetings
2. Cultivating Our Own to Lead
3. Leadership Institute
4. CSRP Support
5. Governance Meetings

Professional Development for Administrators

Figure 36 reports the total professional development hours that NMTC administrators have participated in by focus area for 2001-02, 2002-03, and 2003-04. For 2002-03 and 2003-04, 6 administrators in addition to the 12 principals in 2001-02 are included in this figure.

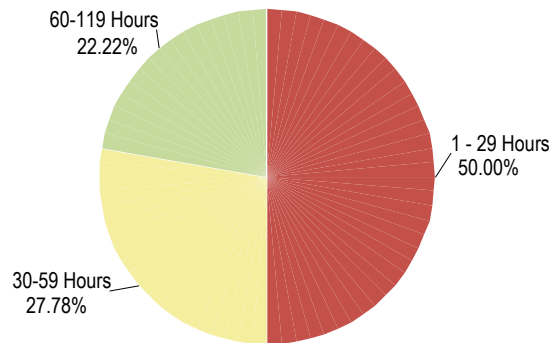
Figure 36
Administrators' Total Professional Development Hours by Focus Area and Year



In 2001-02, professional development among administrators included 632 hours of ‘Leadership Development’, for an average rate of 53 hours/administrator during the year. In 2002-03, administrators professional development declined by 99 hours total while becoming more diverse, spreading across the 9 focus areas. During the most recent year (2003-04), administrators’ hours of professional development increased by 41 hours over 2002-03. Across all years, ‘Leadership Development’ accounted for the most hours, as one would expect (2001-02: 632 hours; 2002-03: 392 hours; 2003-04: 396 hours). The second most common focus area among administrators was ‘Technology Content’ (2002-03: 86 hours; 2003-04: 41 hours) while the two least common focus areas were ‘Indirect Professional Development’ (2002-03: 4 hours; 2003-04: 0 hours).

Figure 37 reports the number of hours of professional development which administrators participated in during the 2003-04 Academic Year.

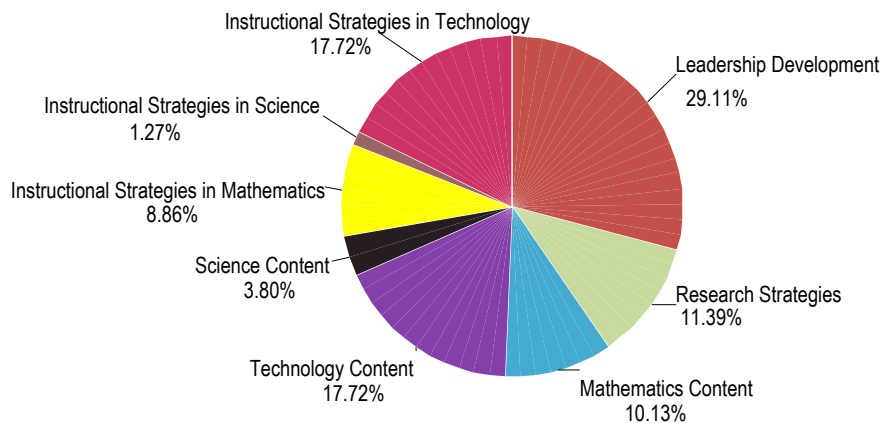
Figure 37
Administrators' Professional Development Hours
2003-04 Academic Year (N=18)



Half (50%) of administrators participated in 1-29 hours of professional development in 2003-04, while a little more than a quarter (28%) participated in 30-59 hours and a little less than a quarter (22%) participated in 60-119 hours.

Figure 38 reports the focus areas of administrator's professional development activities during 2003-04.

Figure 38
Administrators' Professional Development Focus Areas
2003-04 Academic Year



The most common focus areas of administrators' professional development focus area was appropriately Leadership Development (29%) followed by Technology Content (18%) and Instructional Strategies in Technology (18%).

CENAC Monthly meetings

Monthly CENAC Meetings are held at alternating NMTC schools. These meetings are utilized to bring together NMTC leaders and school principals to discuss common issues and concerns. Moreover, when appropriate, for CENAC to formulate policy recommendations and positions regarding educational issues. CENAC aims to find common solutions to problems that are systemic and/or spread across the schools. Meeting topics include but are not limited to planning of upcoming events, budgetary updates, NMTC project component descriptions and updates, introduction of new staff, and discussions of policy concerns and actions. Below available Meeting Minutes from monthly CENAC meetings have been summarized. This summary is followed by an evaluation of the content of the minutes. Please note that this evaluation is based on the available Meeting Minutes and may not include all relevant details from CENAC minutes.

Summary of CENAC Meeting Minutes

January 3, 2002 - Attendees were asked to encourage participation in the upcoming CENAC Rally on 1/25/02. An update on COOL was given; syllabi of the first class on Leadership Exploration held in Fall 2002 at New Mexico Highlands University (NMHU) were distributed and it was reiterated that all Leadership Exploration classes were geared for BIA type administration. The prior evening a brainstorming session was held to discuss CENAC's vision, mission, membership, purpose, goals, and strategies. Several members offered to meet again to finalize document.

February 7, 2002 - A schedule of events regarding MST School Leaders (Action Research, MST Retreat, NCTM Conference) was discussed. Non-MST Leaders who have been trained to lead FANS and Family Science workshops were encourage to lead workshops (through Honorariums) at their school sites for Families Achieving New Standards in Math, Science and Technology Education (FANS) and Family Math. Lastly, an announcement was made that resources are available for Math, Science, and Technology Training at individual school sites.

March 5, 2003 - Attendees were informed that a Special Education Follow-up Session is to be held in Seattle and that each school should have team attending (funding of \$3,500 per school team will be provided). A Technology Project Director Position needs to be filled; candidates will be interviewed at SFIS and a meeting to be held to resolve whether the position will be part-time or fulltime. A concern regarding whose budget the Technology Project Director's salary would come from was brought up (CENAC or SFIS). Attendees were reminded that Brain Classes had two weeks left and that participants should implement the strategies learned in their schools. Bus drivers were discussed as a common concern for all schools but T'siya, Isleta, and Jemez. Attendees discussed their concern regarding the quality of buses and bus routes. In regards to the Science Fair, it was noted that a list of winners will be faxed to schools. It was also mentioned that the fair needs to be better coordinated, perhaps by having one person per school be involved in planning.

August 5, 2003 - A Math/Science Collaborations overview of the three year plan was distributed to attendees. A discussion of COOL took place in which successes included the cohort working well, theory and application, principals advisory groups and tutorials. Areas needing improvements included course work and internships being overwhelming and NMHU communication and course availability needing adjustments. Lastly, plans to upgrade the computer network at all schools as part of Year 1 Technology improvements were discussed.

September 4, 2003 - The meeting began with a review of CENAC goals/purpose. The description stated "Become a voice for/to Bureau and a forum for principals to come together and discuss common issues and take formal positions on issues when appropriate. CENAC's goal is finding common solutions to problems. CENAC has led to securing grants, forming consortiums, securing additional resources for schools, developing

professional development opportunities for school staff.” It was agreed that there is no need to change informal nature of the organization as it is working successfully. An update regarding Science Fairs was given stating that local schools will have their own science fairs; the CENAC-wide fair will follow the local school fairs. Attendees were asked to encourage students to engage in culturally-based and community-based science projects. A planning committee meeting has been set. The committee is seeking funds for awards, refreshments, lunch, etc. It was mentioned that NMTC is moving towards addressing more “school specific” needs. Debbie Scruggs will be meeting with principals to determine those needs. In regards to Brain compatible strategies in math and science, Brain 101 was canceled due to a lack of funds (\$35,000-\$40,000 estimated). The CENAC Rally will focus on Technology this year, however there is not as much funding for the Rally as in previous years.

October 2, 2003 - Principals have decided to write a position paper regarding current issues in BIA. Debbie Scruggs has met with all but a couple of schools regarding their Individualized School Plans (ISPs). It was reported that the Mathland group is doing wonderfully. A PowerPoint presentation was distributed to all schools explaining the Science Fair process.

November 6, 2003 - A draft of the positions paper written by the principals regarding current issues in the BIA was distributed to attendees. A Science Fair update was given noting that binders have been created with guidelines. Moreover, the Science Fair will include a Native Scientist Award.

December 4, 2003 - A Spelling Bee was scheduled for February 3rd, 2004 for CENAC elementary schools at Laguna. Six participants per school from grades 4-6 were invited to attend. In regards to COOL, SFIS may apply for a state grant to train teacher and administrators. CENAC is looking at the University of Oklahoma to provide professional development training on “Overcoming Dyslexia”. Details will be discussed at next meeting.

January 7, 2004 - Attendees were asked to encourage staff to sign up for NABS. In regards to the Rally, the University of Oklahoma was mentioned as a participant as well as a registration fee of \$25 per participant.

February 5, 2004 - The Spelling Bee was discussed and it was suggested that CENAC standardize the Spelling Bee in terms of the number of contestants from each school, etc. The Science Fair was reviewed with comments that the Science Fair was well planned, NMTC should help next year to get judges, and the planning committee was useful. The NABS course is full and will focus on hide tanning. Some schools are still not participating in ISPs. It was stated that schools not participating need to get involved immediately or let Debbie Scruggs know if they are choosing to not be involved. NMTC will be inviting local partners (businesses, Departments of Education etc.) to CENAC meetings. Principals noted that the partners will be observers and will be limited to two or three per meeting. In discussion of the CENAC Rally, there was a concern about the range of abilities in each session. About 380 people attended the rally. However there was low attendance at the last session of the rally; this issue of low attendance will be addressed by individual school principals.

Analysis of CENAC Meeting Minutes

Overall, CENAC Meeting Minutes presented a helpful overview of the meetings procedures and outcomes. Some discussions and initiatives were “carried” across consecutive meetings. For example, on October 2, 2003 Principals decided to write a position paper regarding issues in the BIA. During the following meeting, November 6, 2003, a draft of that position paper was distributed to attendees. It is clear from meeting minutes that CENAC meetings are well structured and emphasize relevant and important topics for NMTC schools. It is also evident that communication and joint-decision making is a priority that takes precedence at CENAC meetings and greatly impacts the meeting agendas as well as outcomes.

On the other hand, some topics/discussions were mentioned at one meeting and did not appear to continue to the next meeting when appropriate. On March 5, 2003 some attendees discussed a concern regarding bus drivers. However, it appears from the available Minutes that this topic was not formally addressed again with a position paper or other policy advocacy methods. Another disconnect between meetings appeared regarding the Spelling Bee. On December 4, 2003 schools were invited to bring six students in grades 4-6 to the Spelling Bee at Laguna. Two months later, in an after-event discussion of the Spelling Bee, it was recommended that CENAC standardize the number of contestants from each school and other details. It is possible that meeting attendees varied between the two meetings, yet an underlying issue may be a lack of dissemination of decisions made at CENAC meetings to all interested/involved parties.

Principal Feedback Regarding CENAC Monthly Meetings

CENAC Monthly Meetings received very high ratings from the four principal questionnaires received as of June 18, 2004. Three ratings of “excellent” were given along with 1 rating of “good”. All comments regarding the CENAC meeting from principals were positive in nature. These comments included, “I find the monthly CENAC meeting very rewarding. It is important for the principals to collaborate and support each other”; “I just started attending and I really think this it is very beneficial”; and “(These) necessary meetings allow for communication between school to happen.” Principal comments indicate the strength of the CENAC Monthly Meetings in building collaboration and providing support for principals and schools.

Cultivating Our Own to Lead (COOL)

COOL is as a project of the SFIS funded by the United States Department of Education, which has certified 25 Native teachers as administrators. The COOL program was initially granted funding for a 3 year period (September 1, 2001 – June 30, 2004); a 1 year extension was requested in order to continue support of a women’s educational leadership support group and monthly Principal’s Advisory Group meetings. There were 25 self-selected participants in the COOL program who met specific requirements. These individuals, all but 1 of whom were females, were from NMTC schools, the New Mexico State Department of Education (NM SDE), and a public school. Participants’ tuition and fees were paid by the program; additionally all participants received a laptop computer and a personal PCS. Participants were involved in a variety of programs to aid in their preparation as school administrators including taking classes through New Mexico Highlands University (NMHU), holding internships in a variety of school settings, and doing research projects. Upon completion of the COOL program, participants were certified to work as principals in schools across the state of New Mexico.

Two documents have been produced to evaluate the COOL program and are discussed in the following paragraphs. The 2002-03 COOL Evaluation Report, compiled by NMTC personnel, identified a number of areas of strength as well as areas needing improvement within the program. The COOL program also hired an external evaluator, Elaine J. Salinas, an Indian educator with over 30 years experience working with educational and social services programs,, for the three year funding period. The external evaluator produced a three year summary evaluation report at the completion of the program.

The use of a “cohort approach” (COOL program participants taking classes together and “traveling” through the program simultaneously) was recognized as a primary strength of the program in its ability to provide support for participants and for its “value and cultural resonance for Pueblo and other Native students” by both the NMTC evaluation report and the external evaluation report. The NMTC evaluation report also noted that participants and principals/mentors sited the inclusion of an internship in the COOL experience as an integrative approach which facilitated the immediate usage of knowledge gained within coursework. Additionally, CENAC Principals Advisory Group meetings were seen by both the NMTC and external evaluation reports as providing

an open forum for the discussion of the roles of administrators and for all involved to meet with a larger group of individuals.

The external evaluation report also mentioned the responsiveness of course content and delivery and tailored program support as additional COOL program strengths. The report mentioned the dramatic effect many courses had on COOL program participants as well as the effect of the COOL program on NMHU faculty teaching methods and approach to Native students. In regards to the program's tailored support, the Project Director's "knowledge, caring, and commitment to the cohort" was critical to the success of both individual cohort members as well as the group as a whole, according to the external evaluator.

Areas identified as working less well or needing further consideration in both the NMTC and the external evaluation report included internships and the administrative partnership between NMHU and the COOL Program. Participants in the COOL program reported feeling "torn" between their classroom teaching responsibilities and finding sufficient time for their internships. Principals/mentors mentioned that program participants do not have sufficient time to take full advantage of the internship, simultaneously principals/mentors do not have sufficient time to devote to their interns. The internal COOL Evaluation report describes a communication breakdown between NMHU and the COOL program which led to a variety of setbacks for the COOL program and its participants including problems with course scheduling, faculty teaching assignments, billing delays, the receipt of books, and student receipt of credit for courses. These setbacks were identified within the internal COOL Evaluation Report as being partially caused by a medical emergency involving a NMHU coordinator, but also attributable to inadequate responses by NMHU.

Additionally, the external evaluation report commented on the participant self-selection for involvement in the COOL program. The requirements for participation in COOL included teaching experience; hence given the nature of education as a female dominated field, the COOL program was almost entirely made up of females (24 out of 25 participants). The external evaluator noted that the lack of males in the program may contribute to a lack of gender diversity in critical areas (such as differing gender perspective in courses at NMHU) while also noting that on the other hand, the COOL program did address a great historical imbalance in the gender of education leadership.

Principal Feedback Regarding COOL

It appears from the four principal questionnaires that the COOL Program is respected and appreciated by the four principals. There were 3 ratings of "excellent" and one missing rating. One Principal mentioned that the program is "a great opportunity for aspiring administration". A separate question on the principal questionnaire related to COOL Dinner Meetings which also appeared to be perceived as worthwhile and very useful by the respondents. Ratings of COOL Dinner Meetings included 2 ratings of "good" and 2 ratings of "excellent". One principal's comment represented the four principals' feedback well: "(COOL Dinner Meetings are) very good for sharing experiences and professional development".

Governance Meetings

The SFIS implemented Governance Meetings in an effort to positively impact the BIA through the expertise of tribal leadership. Governance Meetings explore methods to ensure tribal sovereignty at the SFIS, which is co-owned by 19 tribes. Further goals of the Governance Meetings are to impact how Pueblo people participate in the progress of their educational system and to affect a commitment to high quality math and science education for all students. The NMTC 2002-03 Annual Report cites an example of the role of Governance Meeting in aiding policy change: CENAC schools questioned the appropriateness and fairness of the BIA's approach to Adequate Yearly Progress (AYP) during the summer of 2003 and by the fall, the BIA had revised the formula.

NMTC Strategic Meeting

The NMTC Strategic Planning Meeting was held on March 9, 2004 in Albuquerque. NMTC/CENAC personnel recorded the discussions at these meetings. The content of pertinent meeting minutes are outlined below. Input regarding strengths and weaknesses of program areas was recorded directly from the feedback of leadership teams involved in each NMTC component.

- **MST Leaders:** Documents from the NMTC strategic planning meetings suggest that MST Leaders would benefit from communicating outside of the group, increasing attendance at meetings, implementing content and models and increasing communication with principals.
- **NABS:** Lessons plans have been successfully developed and community experts and western scientists support has been initiated. An additional strength of NABS as defined by NMTC leaders is that MST leadership exists within the program.
- **School Reform Rally:** School's support of rally, registration, rally committee, early planning, bringing together of NMTC were all cited as positive aspects of the School Reform Rally. On the other hand, the need for further implementation and encouragement for staff to remain at the rally all day were cited as areas needing improvement.
- **Science Fair:** Meeting documents indicated that a strength of the Science Fair was the existence of high expectations. The native science category and guidelines/procedures were also specified as Science Fair strengths. On the other hand, a need for follow-up to help winners get to AISES, etc was expressed.
- **Data Base:** A need for definitions/categories, cleansing of data and increased follow-up was expressed at the NMTC Strategic Planning Meeting. Improvements cited include the staff starting to be accountable for forms and data entry.
- **Professional Development:** Attendance, advance sign-up and school level implementation were all indicated as area needing attention. On the other hand, professional development sessions being research-based were described as a strength. Moreover, some teachers were using the training in their classrooms.
- **Individualized School Plans:** Principal and teacher input regarding individualized school plans was cited as a strength in addition to the ISP's focus on mathematics and science content. While meeting documents depict that increased schools participation and meeting of deadlines are areas needing improvement.
- **Partners Council:** The NMTC Strategic Planning Meeting documents indicate that the plan to revise partners' role were a perceived strength of the Partners Council while attendance, involvement, and dialogue between partners outside meetings were cited as areas of the Partners Council needing additional attention.
- **CENAC:** Camaraderie, cohesiveness, the involvement of principals, monthly meetings, and support for principals were cited as strengths of CENAC. An area needing additional attention was commitment to attendance at CENAC/COOL meetings ahead of time.
- **Newsletter:** Meeting documents indicate that article division among staff and newsletter appearance were strengths of the newsletter while the inclusion of articles on each school and meeting of deadlines are areas where improvements can be made.

Section 3: Resource Convergence (Driver 3)

Resource Convergence is geared towards providing improved mathematics and science education including fiscal, intellectual, material, curricular, and extracurricular resources. The intended outcome is a system wherein resources are consistently and uniformly upgraded, renewed, and improved. The components of the Resource Convergence driver are detailed in Figure 39.

Figure 39
Driver III Components

1. Partners Council
2. NM Partnership for Mathematics and Science Education
3. Intel Teach to the Future
4. SFIS Community-Based Education Model
5. CENAC
6. Cultivating Our Own to Lead
7. Youth Leadership
8. Enhancing Education Through Technology

Partners Council

The Partners Council consisted of a group of professionals in math and science fields, educators of Pueblo children, Pueblo professionals, university/college members, industry members and researchers amongst others. The Partners Council served to guide NMTC through quarterly meetings and other communication. Meeting documentation and observations indicates that Partners Council meetings focused on pertinent concerns of the NMTC using the Partners Council as a resource to address policy changes and implementation.

The original intent of the Partners Council was to provide NMTC with a source of mentoring and guidance for program goals and administrative direction. Further, as described in the NMTC Proposal, with a strong commitment from the Partners Council, additional benefits to the NMTC would include access to recent education research in related fields, networking of resources, utilization of resources for professional development, and direction for improving math and science content knowledge and teaching pedagogy.

In 2001-02, meeting documentation and observations indicate that members of the Partners Council included representatives from the College of Santa Fe, Los Alamos National Laboratory (LANL), Northern New Mexico Community College (NNMCC), and the University of New Mexico (UNM). During the following year, 2002-03, meeting documents and observations indicate that the number of partners had declined. The NMTC Strategic Planning meeting on March 9, 2004 further revealed that NMTC management felt that the Partners Council was lacking commitment, content, and implementation. Moreover, difficulties communicating with members were cited in addition to a lack of definition of services and support. Following the March 9, 2004 Strategic Planning meeting, it was decided by NMTC that the Partners Council would be discontinued.

NM Partnership for Mathematics and Science Education

The NM Partnership for Mathematics and Science Education (NMPMSE) has provided NMTC with a public school partner that is successfully using MathLand. The public school teachers (from Navajo Elementary

School in Albuquerque's South Valley) mentor two CENAC schools (Sky City Community School and Laguna Elementary School) in the use of inquiry-based approaches necessary to teaching MathLand.

Teachers from the three schools met on six separate occasions between August 2003 and April 2004. Topics discussed at these meeting included examination of MathLand units, overview of the program's nature, analyzing student work, evaluating strategies, games for each grade level, resource material, etc. NMTC stated in its April 2004 Newsletter that they aspire to encourage more teachers to become involved in the Mathland study group as the partnership continues.

NMTC Teacher Interviews' Feedback Regarding MathLand and Summer Math Courses – November 2004

Two responding teachers attended MathLand training while the one responding teachers' aide attended the Summer Math Course (which focused on Everday Math, another standards-based curriculum for mathematics). These trainings are reported here as both trainings focused on math content and instructional strategies and because there was a limited number of respondents in each group. Two of the respondents attended "all" the training sessions while one attended "a few". The individual who missed sessions reported that time constraints and travel requirements were the reasons for her/his absences. The three respondents rated their skill level prior to the training as "5" or lower, with mostly "2" and "3"s in content, instructional strategies and inclusion of Native Ways.

The respondents reported that the skills taught at the trainings included "using manipulatives and helping children explore for themselves", "Geometry and early Algebra through hands on activities", and "learning what comes in the MathLand bins I have in my classroom". Respondents also remembered the instructors utilizing the following teaching methods: "hands-on, experimental concepts that you worked out by yourself", "hands-on activities such as modeling lessons", and "groupwork, hands-on activities and demonstrations of different ways of learning concepts". When asked to rate their instructors, respondents ratings on a scale of 1 to 10 included 1 "7", 1 "9" and 1 "10". The teachers explained their instructor ratings by saying "sometimes there seemed to be a divide between the instructor and the teachers in that the instructors weren't always sensitive to teachers' skill levels"; "They made it fun and were really knowledgeable and enthusiastic"; and "The instructor gave me the confidence to be more open in my teaching".

Following the training, teachers rated their skill levels in content, instructional strategies, and inclusion of Native Ways between "7" and "9" on a scale of 1 to 10 across all categories. One teacher, who reported that her/his skill level in inclusion of Native Ways showed the least improvement, commented that "The MathLand Study Groups didn't really focus on Native Ways". Later in the interview, another teacher commented, "the inclusion of Native Ways was not addressed directly by the instructors; but the curriculum does focus on hands-on methods, which is helpful". When asked 'how often do you use your training in the classroom', respondents said things like "Almost everyday. We do board games, work on the MathLand books, and use manipulatives" and "2 to 4 times a week we use the curricular materials". Respondents were asked, "Tell me about any difficulties you faced in implementing training in your classroom and any practices taught at the training that were ineffective in your classroom?". One teacher commented that "time and materials" are the major setbacks while another said "it's hard to implement the scope and sequence of things that were taught". Another teacher noted "The children who had MathLand since Kindergarten just soar with it, my problem with MathLand is that it assumes that children in 4th grade already have all these concepts and knowledge from K-3, when they don't." Another problem mentioned regarding MathLand is that "parents don't understand it and so we don't send it home as homework"; the teacher who reported this problem noted that the instructors were aware of and discussed not giving MathLand activities as homework.

When asked “Do you have any recommendations for future trainings?”, two respondents focused on the actual trainings while one focused on participation in the training. The two recommendations for changing the trainings were, “Don’t have the trainings on Saturday and shorten the lengths of the trainings session to 1 to 2 hours during school days” and “Give out more samples to help with instruction”. The one teacher who was concerned with participation stated “I really feel that teachers need to give MathLand a chance. We’re not all on the same page and doing the same thing at my school. Not all teachers are using MathLand. We’re all doing our own things and it’s really not doing right by the kids”.

Two teachers reported that there was minimal or no emphasis on the Inclusion of Native Ways in the training they attended. When asked “how did the training help you to increase the use of Native ways specific to the Pueblo where you teach in math and science?”, the teachers who reported limited or no emphasis on Native Ways said, “mostly just in the symmetry designs and geometric kinds of things” and the other mentioned “the curriculum focuses on hands-on methods, which is helpful”. The remaining teacher said, “When you come to the math and science of culture, it all revolves around math calculations”. Teachers were also asked “How do you feel the training benefited the Pueblo community where you teach?”; two responses were given. One teacher commented, “it gives students and the community more positive knowledge and skills”; the other said, “I don’t know about the whole school, but my classes’ math test scores have gone up”.

Intel Teach to the Future

Sixty teachers from 4 NMTC schools (Santa Clara, Tesuque, Taos, and Ohkay Owingeh) were trained by Intel Teach to the Future in the use of technology. Many of these teachers have been active in training school staff in the use of technology. Additionally, Intel funds were utilized to purchase software and teaching manuals. However, NMTC’s personnel report that while teachers are using the information they obtained through participation in Intel Teach to the Future, none of the teachers are providing professional development at their schools.

SFIS Community-Based Education Model

The Community-Based Education Model (CBEM) at the SFIS, a program which has been in existence for over seven years, is a partner of NMTC. The CBEM aims to institutionalize community-based education approaches to math and science in local pueblos and at SFIS. Additional focus is placed on tribal government and communication skills. Outside evaluation of CBEM found it to be “successful by Western educational standards” based on increases in standardized test scores for CBEM students over the general population of students at SFIS. Additionally, prior evaluation has found that the majority of CBEM students either enter the environmental science or technology workforce in their communities or enter college and major in a field of technology or science. On the other hand, CBEM evaluations have also noted the program’s need to “gather more data more consistently”. The NMTC’s 2002-03 Annual Report also mentions that like CBEM, it is striving to develop a measure of how approaches to math, science and technology impact students’ capacity to give back to their communities, to work with their community, and to assure that Pueblo people drive advances in their communities within math, science, and technology.

Youth Leadership Program

The NMTC began a relationship with the Youth Leadership Program during Year 2. The Youth Leadership Program explores the Pueblo ways of educating youth. NMTC, COOL, and the Youth Leadership Program jointly sponsored a community-based education seminar in June of 2003. The seminar focused upon assisting teachers in understanding Native uses of personal story in teaching.

Section 4: Partnerships (Driver 4)

The goals for partnerships within the NMTC include “broad-based support from parents, policymakers, institutions of higher education, business and industry, foundations, and other segments of the Community for the goals and collective value of the program.” The NMTC Partnerships driver includes those components listed in Figure 40.

Figure 40
Driver IV Components

1. Research A. Cultivating Our Own to Lead B. Community-Based Education
2. Native American Math Education (NAME) Games
3. TechGroup Committee
4. Youth Leadership
5. Rural School and Community Trust
6. Career/Academic Fair

Annenberg Circles of Wisdom

In 1997, the Annenberg Foundation began funding a program called Circle of Wisdom at the SFIS, which focused upon community-based education within the 19 Pueblos in New Mexico. Collaborations between the Annenberg Circles of Wisdom and the NMTC included Tribal-Public School Transition support, an effort to develop culturally-relevant, community-based math and science curriculum and assessment, FANS and MAPPS, developing the MST Team Leader at each school site, and other activities which share common goals.

The NMTC Winter 2003 Newsletter reported that June 30, 2002 marked the end of five years of funding for the Circles of Wisdom program at the SFIS. However, many of the associated programs have been, and will continue to be, maintained through the NMTC.

COOL Research

COOL Participants, as part of their educational leadership training, may choose to conduct research. Dr. Anya Dozier Enos, NMTC Co-PI/Project Director, has acted as a Master’s committee representative for 10 of the Cool Participants.

Native American Math Education (NAME) Games

The NAME Games, co-facilitated by NMTC and SFIS, invite teachers, students and parents to participate in games that focus on problem solving, probability, and critical thinking skills such as cribbage, backgammon, and cards. The intent of NAME Games is to encourage attendees to work together to build their math skills and simultaneously enjoy themselves.

Technology Group Committee

The Technology Committee, formed in the spring of 2002, is comprised of representatives from the NMTC schools. The Committee's intent is to improve the NMTC schools' communication and cooperation regarding the use, maintenance, and upgrade of classroom technology. Meetings are held once a month.

CENAC was awarded a grant, Enhancing Education through Technology, to increase the use and understanding of technology in relationship to increasing student achievement. The Technology Committee aims to place emphasis on helping teachers to assess student skill levels in order to better understand learning challenges and to modify curriculum to suit the needs and goals of individual children.

Rural School and Community Trust

The Rural School and Community Trust is a national nonprofit organization "rooted in rural America" with a mission of helping rural schools and communities. A network of schools and community groups work in conjunction to improve the quality of education and community life and to improve state education policies. The specific goals of the Rural School and Community Trust include, "(1) High quality place-based education, widely practiced in rural schools and communities. (2) Effective, permanent organizations of rural people, active in every state, participating in state and local policy development and ensuring high-quality rural education. (3) A national agenda where rural people and their issues are visible and credible."

NMTC communicates regularly with representatives of the Rural School and Community Trust. One of NMTC's co-PIs, Viola Archuleta, was designated as a Rural faculty member, when meant she was responsible for training others to "explore the meaning and value of their local place in improving education". This was done through attendance at two professional development trainings sessions at which the focus was on place-based (community-based) education. Additionally, NMTC field tests Rural Trust developed modules and protocols at the local level. Some of these protocols were also utilized in training MST Leaders regarding community-based education.

Career/Academic Fair

The Career/Academic Fair is held annually at SFIS, bringing together math and science professionals from local universities and the Los Alamos National Laboratory to provide students with knowledge regarding the usage of math and science in a variety of careers. At the "Building Bridges to the Future" Career/Academic Fair representatives from tribal enterprises such as forestry, environmental program and casinos were present in addition to representatives from health careers, the military, and law enforcement.

Section 5: Student Achievement (Driver 5)

The primary gauge for measuring the success of the NMTC is increases in student achievement in mathematics and science. NMTC schools have utilized the Terra Nova norm referenced assessment to measure student performance. Test data has been collected from NMTC schools for students in grades 3-9 on an annual basis. Test data are analyzed within this section for NMTC schools combined as well for individual school; data have been aggregated by grade level and gender. New Mexico recently implemented a standards based assessment, however data for this standards based assessment are limited. Another important measure of the success of the NMTC's RSI is enrollment in high quality math and science courses at the middle and high school levels hence math course enrollment at SFIS is also reported within this Section.

Challenges with Standardized Test Data in New Mexico

Although data is a challenge for many schools, schools in New Mexico have faced and will continue to face additional challenges as state assessments evolve. The state has used the Terra Nova assessment, a norm referenced test published by CTB, since 1998. However, in 2001, as a reaction to a reported compromise of testing materials in some public school districts, the state changed from the Terra Nova 1 to Terra Nova, the Second Edition. Although the scale scores had been equated by the testing company, the two editions are different in many ways. The first major difference is the norm group used for calculating of scores. The first edition used a 1996 national sample of students, while the Second Edition is normed on a national sample tested in 2000. A second major change was the subtests included in the two assessments. The state had used the complete battery for the Terra Nova 1, which consisted of two subtests for each content area. One subtest measured basic skills, while the other measured more conceptual knowledge. The Terra Nova Second Edition version adopted by the state includes only one subtest for each content area, and minimizes the testing of skill level. The combination of these two changes in the assessment methodology has made it difficult to make longitudinal comparisons.

The newest challenge is the transition from a norm-referenced assessment to a criterion standards based assessment. New Mexico schools have just begun administering this assessment in grades 4, 8 and 11, but the state will have grades 3-9 in place by the 2004-05 school year. Although the criterion assessment is more appropriate, our school administrators and teachers will have a learning curve to properly utilize the new assessments. In addition, the use of constructed response items in the criterion assessments will require students to be able to have a deeper understanding of the content and be able to explain that in writing. This will cause all subject areas to be influenced by the writing ability of our students.

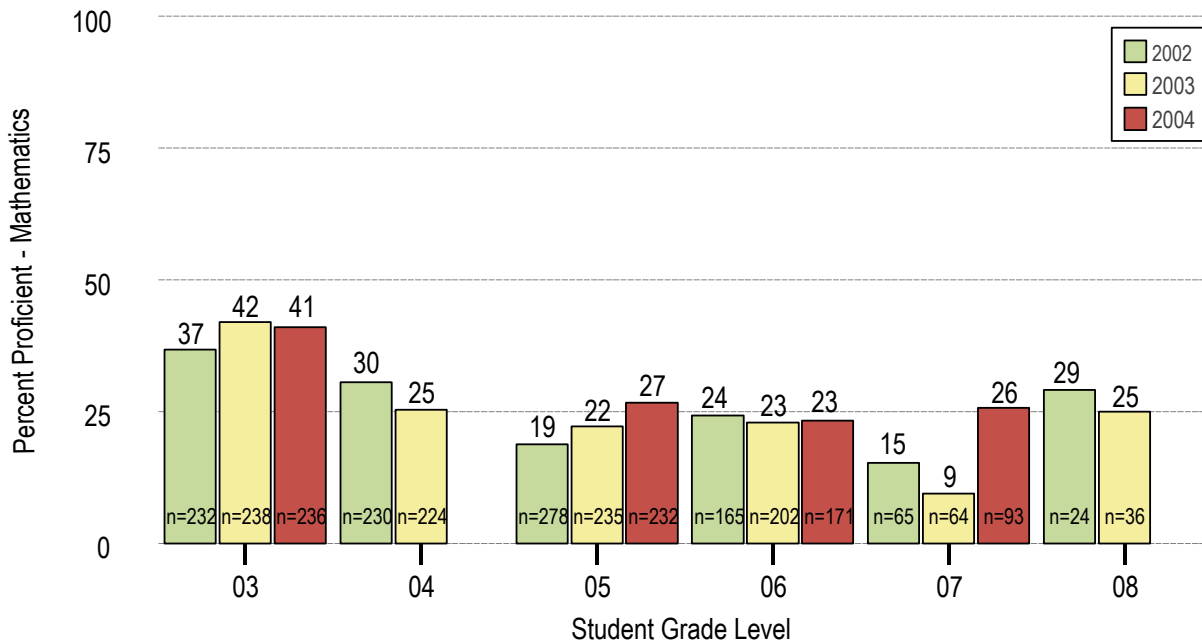
Terra Nova Test Results

The New Mexico Public Education Department (NM PED) uses a Percentile Ranking (PR) of 40 or above on the Terra Nova Test which is a norm referenced test (NRT) to indicate proficiency in its accountability program. NMTC has adopted this "standard" and is presenting the Terra Nova Test results in this manner in order to facilitate the transition to a criterion-referenced test (CRT) environment.

Mathematics

Figure 41 reports the percent of students proficient by grade level across all NMTC schools from 2002 to 2004. Two schools (Taos and SFIS) have been excluded from this and similar figures as their test data for 2004 was missing at the time of the writing of this report.

Figure 41
NMTC-Wide* Mathematics Proficiency by Grade Level**
Percent of NMTC Students meeting New Mexico Proficiency Requirements
(2002-2004)

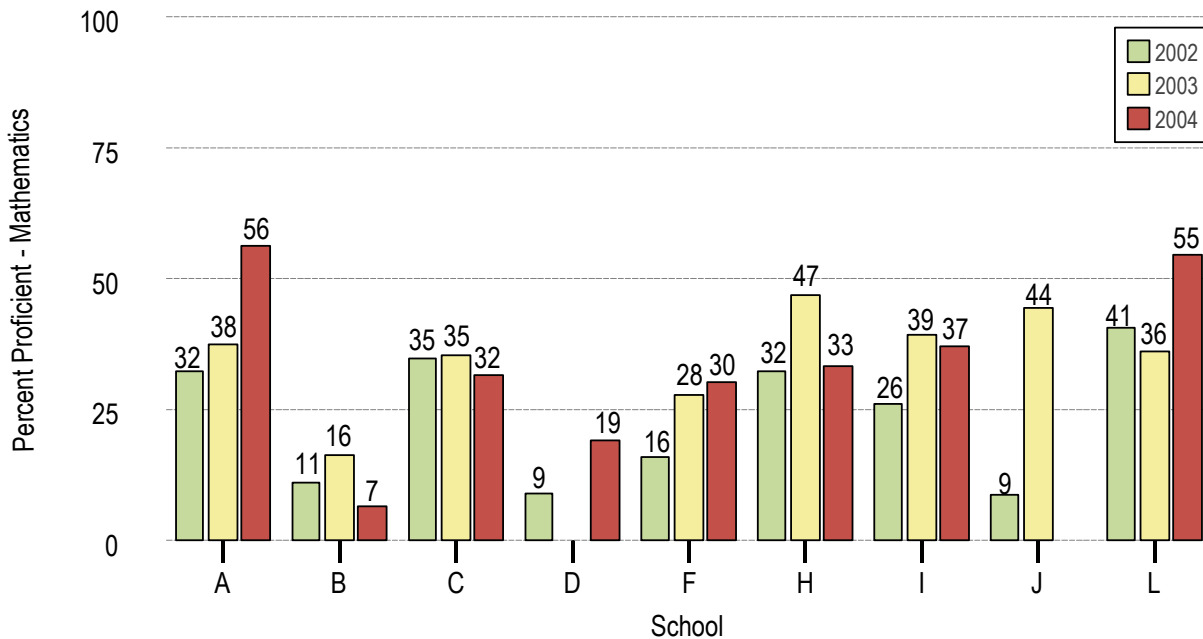


*Please note that this graphic excludes 2 schools (SFIS and Taos) due to missing data in 2004. In 2004, grade 4 and 8 students were not administered the Terra Nova. T'siya added a 7th grade in 2003.
 **PR greater than or equal to 40

The graphics depicts a trend of declining proficiency levels from grade 3 to grade 6. For example, in 2004, 41% of grade 3 students were proficient in mathematics compared to 27% of grade 5 students, and 23% of grade 6. Grade 3 students' proficiency reveals no overall change from 41% in 2001 to 41% in 2004. Proficiency for grade 4 students across the three reported years declined from 2002 to 2003 (30% to 25%). Grade 6 proficiency levels remained nearly level (2002: 24%; 2003: 23%; 2004: 23%). On the other hand, grade 7 proficiency levels declined from 15% in 2001 to 9% in 2003, before increasing drastically to 26% in 2004.

Figure 42 reports mathematics proficiency levels by school for Grades 3 and 5 from 2002 to 2004. Because of the trend of declining test scores after grade 3 depicted in Figure 24, data was first analyzed using all grade levels and then was compared to grades 3, 4, and 5. Significant differences occurred when only grades 3, 4, 5 were utilized. However, grade 4 students were not tested in 2004, hence this grade has also been excluded in order to report the maximum number of years.

Figure 42
Mathematics Proficiency by School*
Percent of Students Meeting New Mexico Proficiency Requirements**
Grades 3 and 5 (2002-2004)



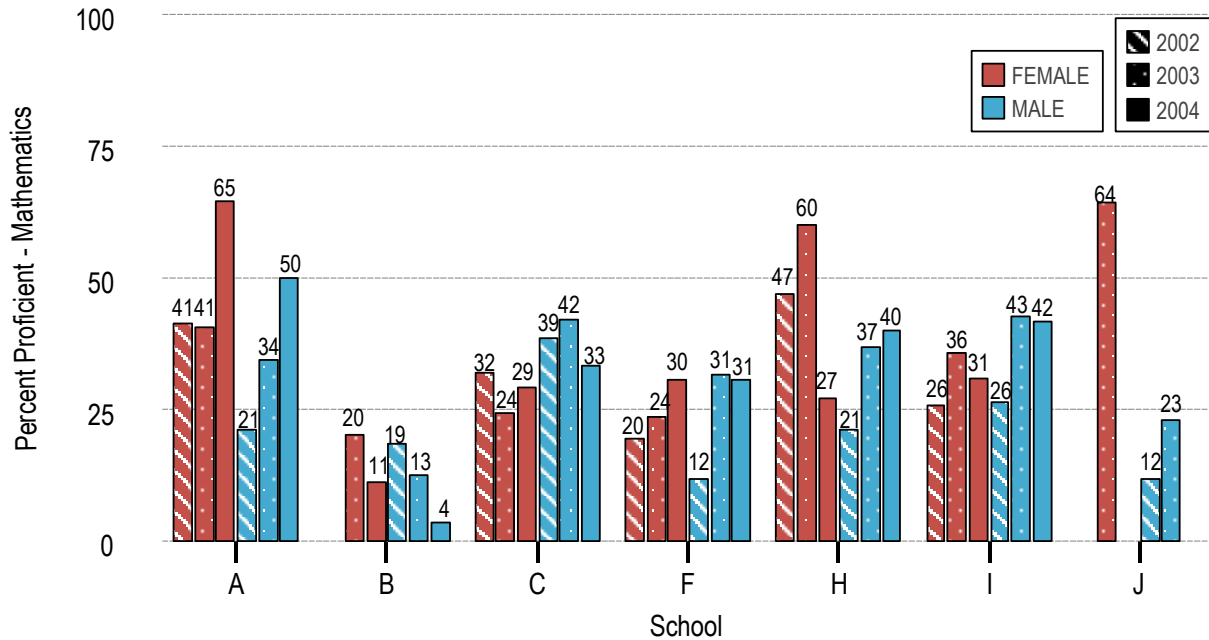
*Please note that this graphic excludes schools with less than 50 students (San Ildefonso and Te Su Geh Oweengh) This graphic also excludes SFIS due to the uniqueness of this school as a Grade 7-12 school. Number of students by school excluded to maintain confidentiality of schools.

**PR greater than or equal to 40

Twenty-five percent or more of students at Schools A, C, H, I, and L were proficient during all three years. The percent of proficient students at Schools A, D, F, H, I, and L rose from 2002 to 2004 while the percent of proficient students at Schools B and C declined from 2002 to 2004. Schools A, F, I, J and L had the most notable increases in proficiency levels across the reported years with all schools percent of students proficient in mathematics increasing by more than 10 percentage points from 2002 to 2004.

Figure 43 reports the percent of students proficient in mathematics by gender and school for grades 3 and 5 from 2002 to 2004.

Figure 43
NMTC-Wide* Mathematics Proficiency by Gender and School**
Percent of NMTC Students meeting New Mexico Proficiency Requirements
Grades 3 and 5 (2002-2004)



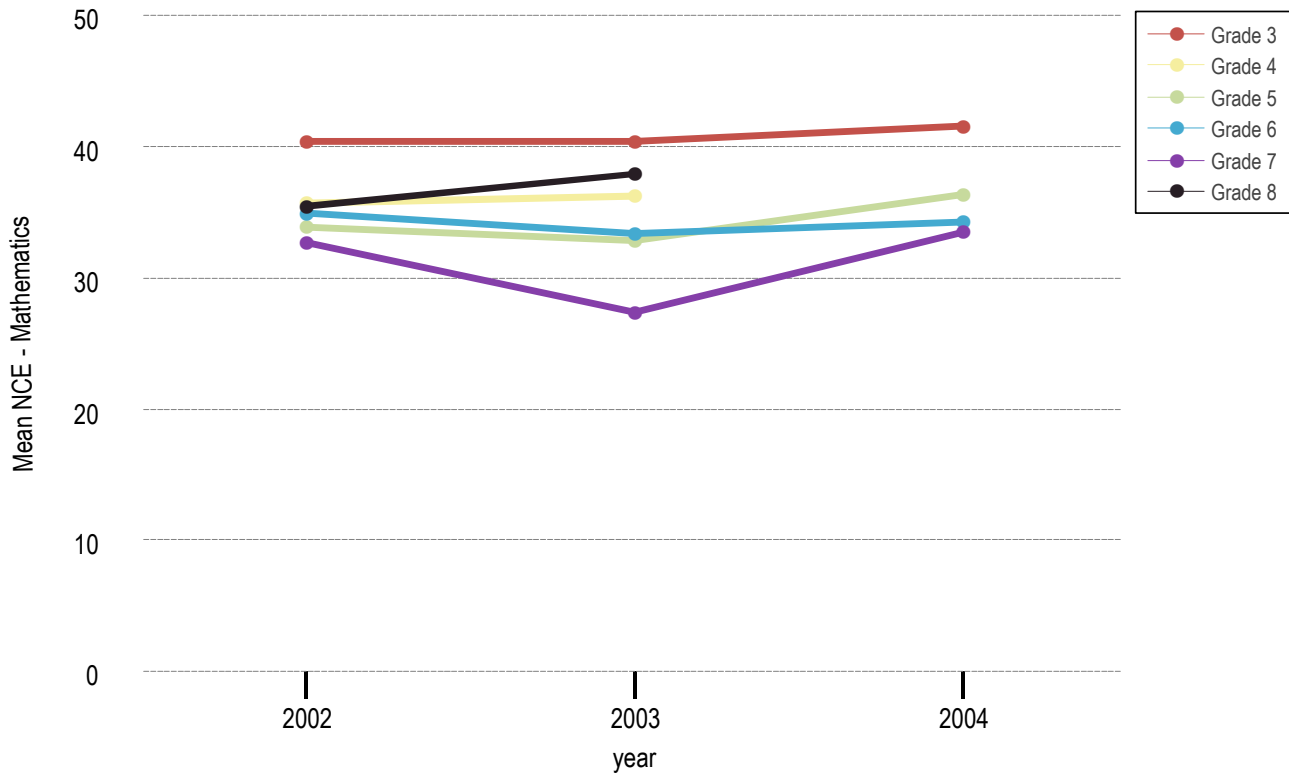
*Please note that this graphic excludes schools with less than 15 students of either gender. SFIS has been excluded from this graphic due to its uniqueness as an exam school.

**PR greater than or equal to 40

At schools A, B, and J, female students' percent proficient in mathematics was equal to or higher than male students in 2004. The schools with female students scoring 10 percentage points or more higher than male students in 2004 were School A (female: 65%; male: 50%) and School J (female: 64%; male: 23%). On the other hand, male students at Schools C, F, H and I were scored 10 percentage points or more higher on percent proficient than female students in 2004 (School H: female: 27%; male: 40%; School I: female: 31%; male: 42%). At School C, male students scores were higher than females across the 3 years.

Figure 44 reports NMTC-wide Mean Mathematics NCEs on the Terra Nova Exam by Grade from 2002 to 2004.

Figure 44
NMTC-Wide* Mean Mathematics NCEs on Terra Nova Exam by Grade
(2002 – 2004)



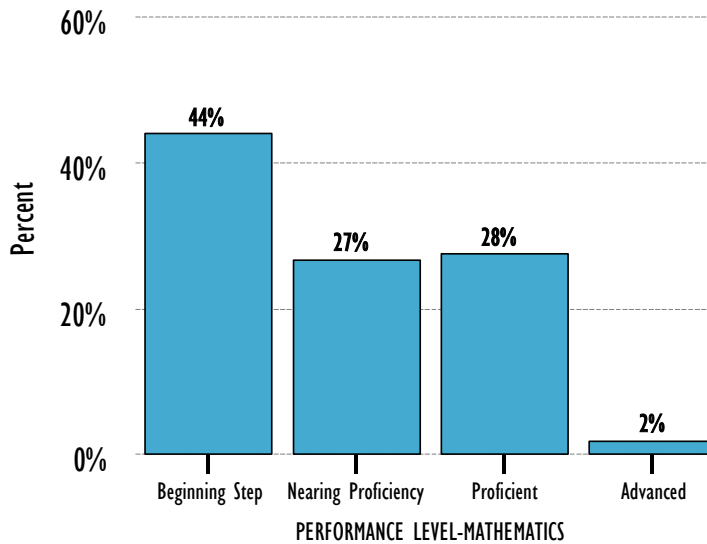
* Please note that schools are included by grade levels taught and that the Terra Nova was not administered to Grade 4 and Grade 8 students in 2004. Also note that figure excludes SFIS (n>275) and Taos (n>=75) who were missing 2004 data..

Across all grade levels except grade 6, NMTC-wide mean NCE’s rose or remained level across the reported years. Moreover, grade 6’s mean NCE fell only slightly from 35 in 2002 to 34 in 2004. All grades mean NCEs fluctuated by no more than 3 points across the years, except grade 7 which fell from 33 in 2002 to 27 in 2003 before rising again to 33 in 2004.

Standards Based Assessment Results

Figure 45 reports mathematics performance levels for grade 4 NMTC students on the 2003-04 New Mexico standards based assessment.

Figure 45
NMTC-wide 4th Grade MATH Performance Levels on NM SBA
2003-04 Academic Year (n=225)

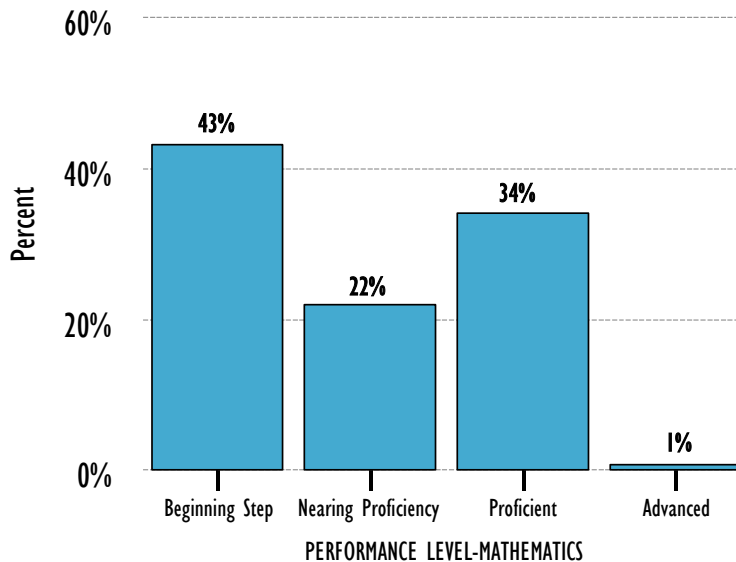


*This Graphics includes data from all schools except Okay Owingeh.

Forty-four percent of NMTC grade 4 students were classified as Beginning Step, 27% were classified as Nearing Proficient, and 30% were classified as Proficient or Advanced.

Figure 46 reports the math performance levels of NMTC grade 8 students on the 2003-04 New Mexico standards based assessment.

Figure 46
NMTC-wide 8th Grade MATH Performance Levels on NM SBA
2003-04 Academic Year (n=132)

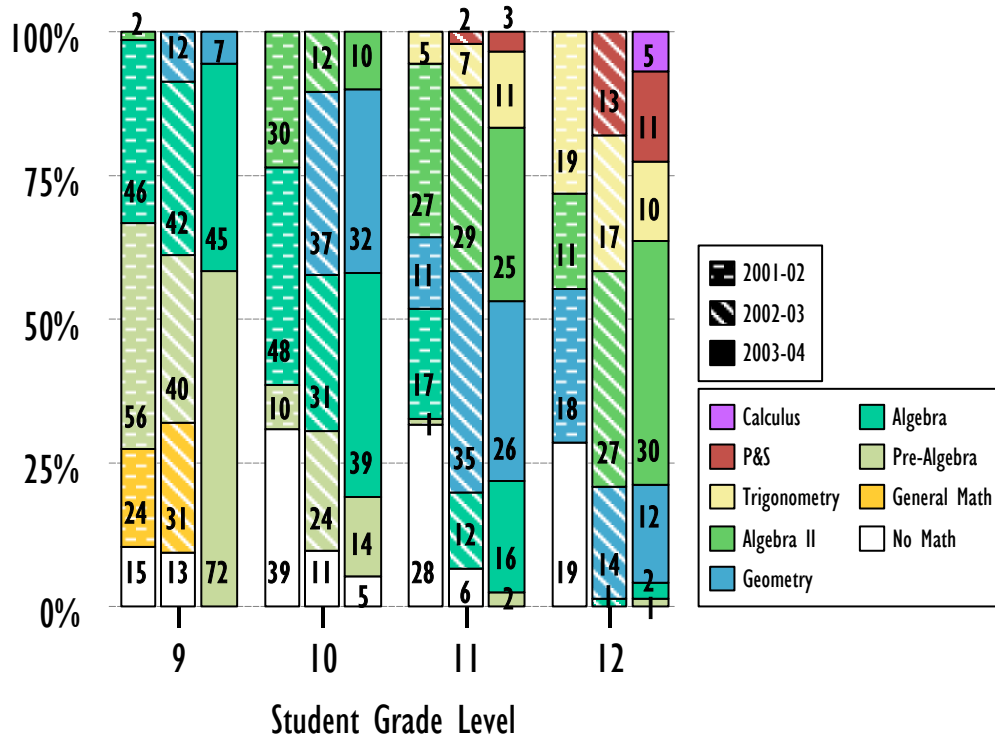


Forty-three percent of 8th graders were classified as Beginning Step, while 22% were classified as Nearing Proficiency and 35% were classified as Proficient or Advanced. Compared to grade 4 students, 5% more of grade 8 students received a classification of Proficient or Advanced.

Student Enrollment in Math/Science Courses

Student ability to determine their course enrollment most often begins at the secondary level. SFIS is the only NMTC school with all secondary grade levels represented, hence data from SFIS has been utilized in Figure 44 to depict math course enrollment. It is also important to note that most often student ability to determine their course enrollment increases with their grade level so that students in Grade 9 have notably less influence on their enrollment than students in Grade 12. Figure 47 depicts enrollment SFIS Math Courses from 2001 to 2004.

Figure 47
Santa Fe Indian School Math Course Enrollment (2001-02 – 2003-04)

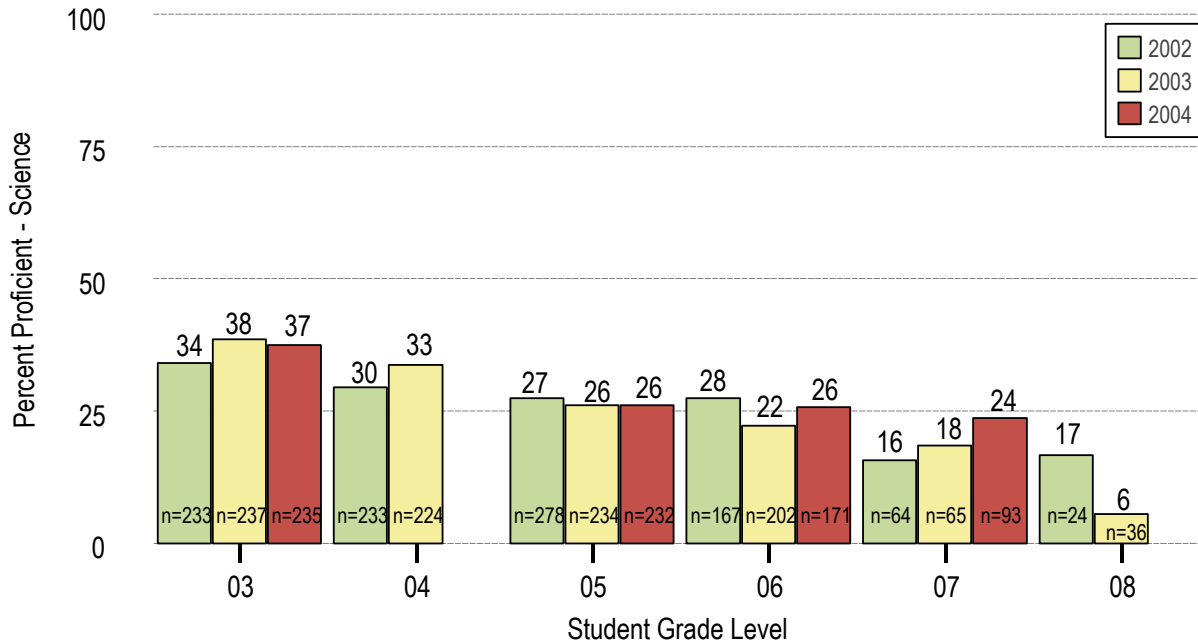


Across all grade levels, students enrollment in no math classes decreased from the 2001-02 academic year to the 2003-04 academic year with the most dramatic decrease being in seniors when in 2001-02 19 students were not enrolled in a math course to 2003-04 when all students were enrolled in math courses. The number of lower class students (freshmen and sophomores) enrolled in Geometry increased across the three academic years: freshmen (2001-02: 0; 2003-04: 7); sophomores (2001-02: 0; 2003-04: 32). Additionally, in 2003-04, 5 students enrolled in Calculus compared to none the previous years.

Science

Figure 48 reports the percent of NMTC students meeting New Mexico proficiency requirements in science by grade level from 2002 to 2004.

Figure 48
NMTC-Wide Science Proficiency by Grade Level
Percent of NMTC Students meeting New Mexico Proficiency Requirements**
(2002-2004)

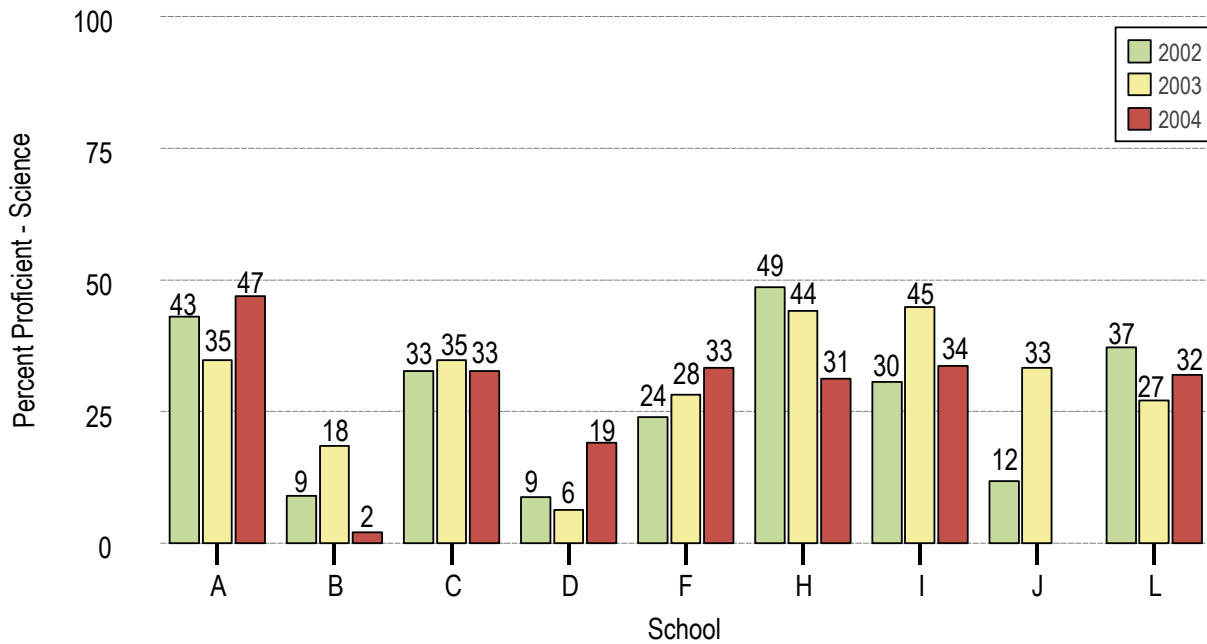


*Please note that this graphic excludes 2 schools (SFIS and Taos) due to missing data in 2004. In 2004, grade 4 and 8 students were not administered the Terra Nova.
 **PR greater than or equal to 40

Grade 3 percent proficient rose from 34% in 2002 to 37% in 2004; Grade 4 percent proficient rose from 30% in 2001 to 33% in 2003; and Grade 7 percent proficient rose from 16% in 2002 to 24% in 2004. Grade 5 percent proficient remained at nearly level (2002: 27%; 2004: 26%) while grade 6 percent proficient fell slightly from 28% in 2002 to 26% in 2004. Grade 8 percent proficient fell from 17% in 2002 to 6% in 2003.

Figure 49 reports science proficiency by school for Grades 3 and 5 from 2002 to 2004. Because of the trend of declining test scores after grade 3 depicted in Figure 41, data was first analyzed using all grade levels and then was compared to grades 3, 4 and 5. Significant differences occurred when only grades 3, 4, 5 were utilized. Grade 4 has been excluded because the Terra Nova was not administered to grade 4 students in 2004.

Figure 49
Science Proficiency by School
Percent of Students Meeting New Mexico Proficiency Requirements**
Grades 3 and 5 (2002-2004)



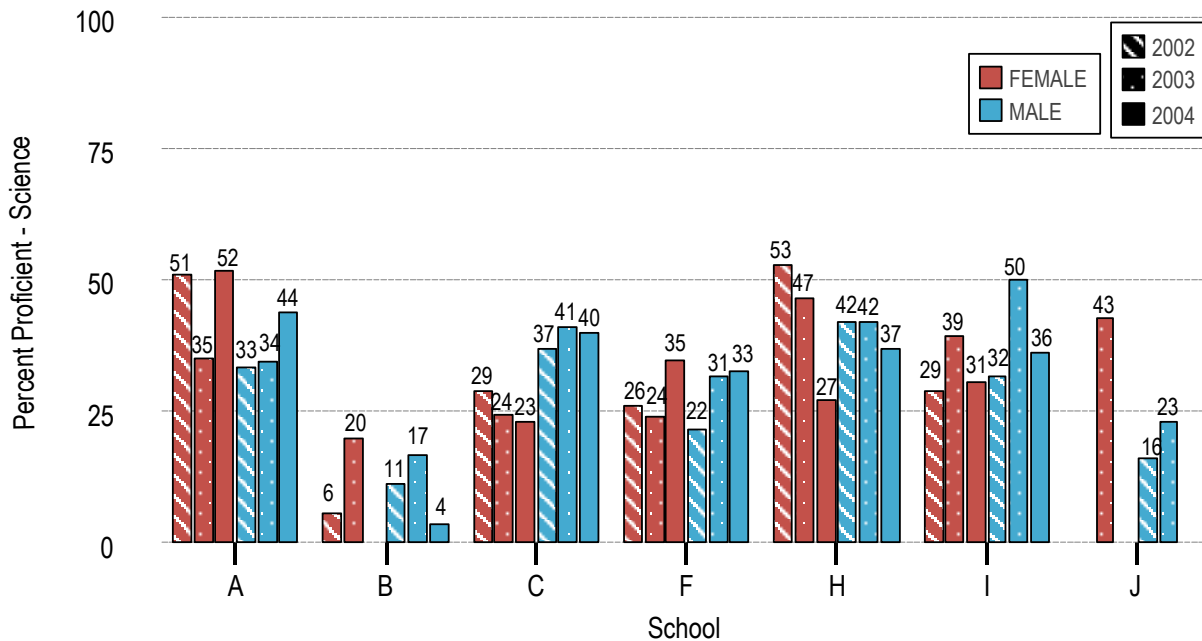
*Please note that this graphic excludes schools with less than 50 students (San Ildefonso and Te Su Geh Oweengh) This graphic also excludes SFIS due to the uniqueness of this school as a Grade 7-12, application school. Number of students by school excluded to maintain confidentiality of schools.

**PR greater than or equal to 40

Twenty-five percent or more of students at Schools A, C, H, I, and L (the same schools as in mathematics) were proficient during all three years. The percent of proficient students at Schools A, D, F, and I rose from 2002 to 2004 while the percent of proficient students at Schools B, H and L declined from 2002 to 2004. Schools H and L experienced gains in mathematics during the same period. While 5 schools increased proficiency levels in mathematics by more than 10 percentage points from 2002 to 2004, the most gain in science was 21 percentage points at School J, followed by 9 percentage points at School F and 4 percentage points at School A.

Figure 50 reports the percent of students proficient in science by gender in grades 3 and 5 from 2002 to 2004.

Figure 50
NMTC-Wide* Science Proficiency by Gender and School
Percent of NMTC Students meeting New Mexico Proficiency Requirements**
Grades 3 and 5 (2002-2004)

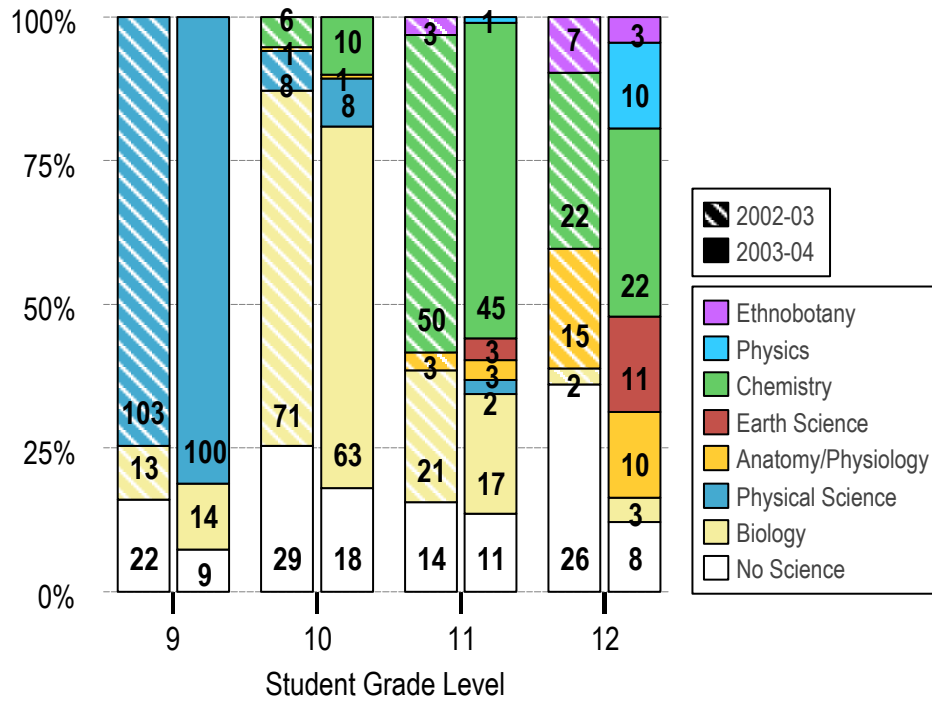


*Please note that this graphic excludes schools with less than 15 students of either gender. SFIS has been excluded from this graphic.
 **PR greater than or equal to 40

In 2004, a higher or equal percent of females were proficient in science than males at Schools A, B, F, and J. The scores did not differ by more than 10 percentage points in 2004 at School A (female: 52%; male: 4%), School B (female: 0%; male: 5%), and School F (female: 35%; male: 33%). At School C, the percent of females proficient in science dropped by 19 percentage points from 2001 to 2004, while the percent of males proficient in science declined by only 3 percentage points (2001: female: 42%; male: 43%; 2004: female: 23%; male: 40%). At School I, male students' percent proficient in science has been notably higher than female students across the 3 years with the greatest disparity between genders in 2003 when 37% of females were proficient compared to 58% of males.

Figure 51 reports enrollment in SFIS Science Courses for Grades 9-12 during the 2002-03 and 2003-04 academic years.

Figure 51
Science Course Enrollment for Grades 9-12
2002-03 and 2003-04 Academic Years



Across all grade levels, the number of students not enrolled in a Science Course decreased from 2002-03 to 2003-04, with the most notable difference in freshmen (2002-03: 22; 2003-04: 9) and seniors (2002-03: 26; 2003-04: 8). Also of note is the enrollment in three new classes in 2003-04: 10 seniors enrolled in Physics and 3 juniors and 11 seniors enrolled in Earth Science. On the other hand, the number of juniors enrolled in Chemistry (2002-03: 50; 2003-04: 45) and Biology (2002-03: 21; 2003-04: 17) decreased across the two years.

Figure 52 reports NMTC-Wide Grade 4 Mean NCEs in Mathematics and Science from 1998 through 2003. Data was limited for the remaining grade levels while Grade 4 students were not administered the Terra Nova in 2004. Please note that in 2001 the exam (Terra Nova I) was changed to Terra Nova, the Second Edition. The differences in these two exams and the ensuing implications are discussed in Section 5, “Challenges with Standardized Test Data in New Mexico”.

Figure 52
NMTC-Wide* Grades 4 Mean NCEs on Terra Nova Exam from 1998 – 2003

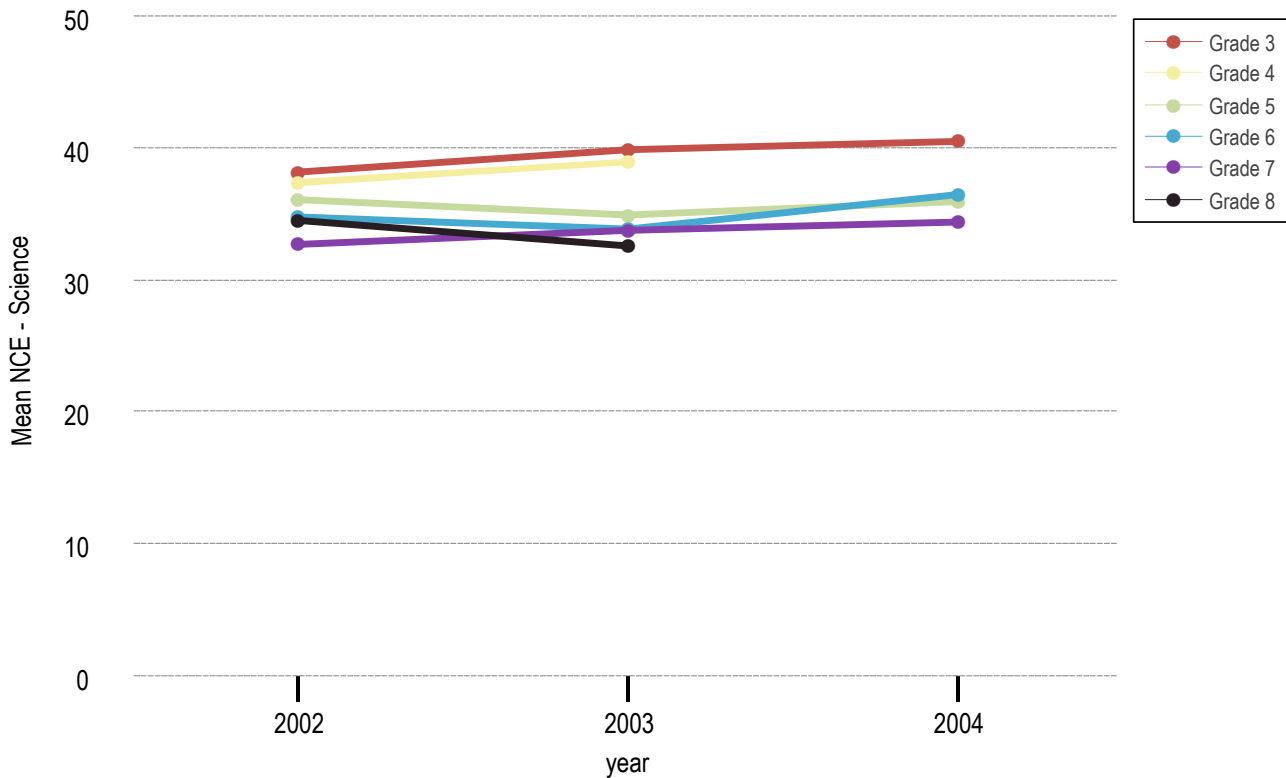


*Data for Tesuque Day School from 2001 was missing and hence is not included in this graphic. Please also note that SFIS has been excluded from this graphic as it does not serve fourth grade students and is unique from the other grade 7 schools. Terra Nova not administered in 2004 to Grade 4 students.

NMTC-Wide Grade 4’s Mean Mathematics NCE rose from 1998 (40) to 2000 (43); NMTC-Wide Grade 4 Mean Science NCE fluctuated during the same time period from 42 (1998) to 36 (1999) to 40 (2000). Following the change in the Terra Nova Exam, both Mathematics and Science Mean NCE scores declined notably from 2000 to 2001 (Mathematics: 43 to 35; Science 40 to 36). In the two years between 2001 and 2003, Grade 4 mean NCEs in Mathematics and Science declined slightly overall ((Mathematics: 35 to 33; Science 36 to 34).

Figure 53 reports NMTC-Wide Science Mean NCEs by Grade level and year from 2002 to 2004.

Figure 53
NMTC-Wide* Mean Science NCEs on Terra Nova Exam by Grade
(2002 – 2004)



*Data for Tesuque Day School (n~15) from 2001 was missing and hence is not included in this graphic. Please also note that schools are included by grade levels taught and that the Terra Nova was not administered to Grade 4 and Grade 8 students in 2004. Also note that figure excludes SFIS (n>275) and Taos (n>75) who were missing 2004 data.

Compared to mathematics mean NCE's, NMTC students' mean NCE's in science were less variable across grade levels, differing by less than 10 points each year while mean NCE on mathematics differed by more than 10 points during some years. Across all reported years, all grade level's mean science NCE's rose or remained constant while only grade 8's declined from 35 in 2002 to 33 in 2003. Grade 3 experienced the largest increase in mean NCE across reported years (2002: 38; 2003: 40; 2004: 41).

Section 6: Eliminating Achievement Gaps (Driver 6)

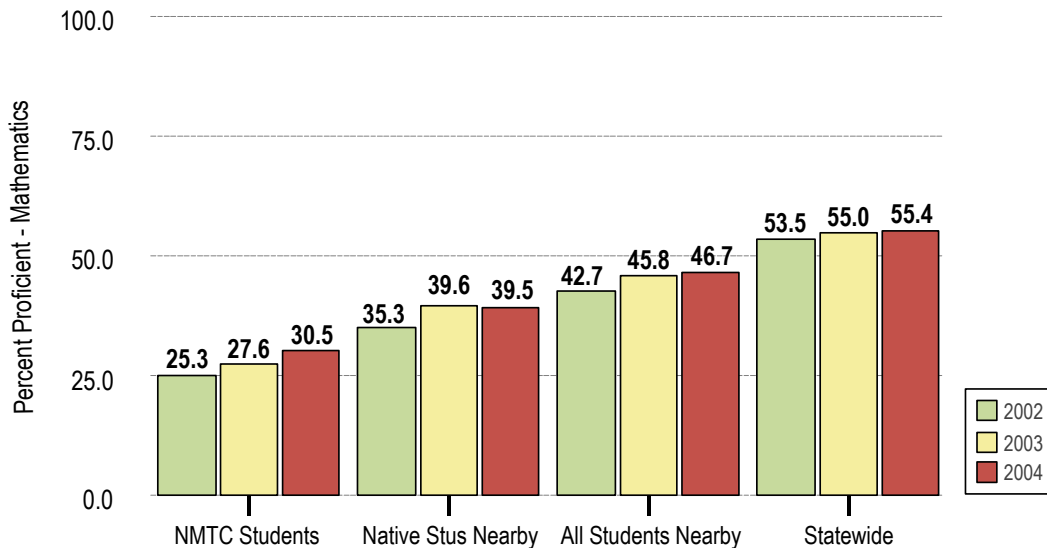
Student Achievement is one way to measure success of the NMTC and its associated program and policies. As test scores most often measure student achievement, this section reports upon achievement differences within NMTC schools and between NMTC schools and other schools.

Terra Nova Test Results

Mathematics

Figure 54 reports the percent of students proficient in mathematics as measured by scoring at or above the 40th percentile on the state mandated Terra Nova/CAT from 2002 to 2004 for four groups of students (NMTC students, Native students nearby, all students nearby and all students statewide).

Figure 54
Percent of Students* Proficient in Mathematics**
Grades 3, 5, 6, and 7, 2002-2004



*graphic excludes 2 schools with missing data in 2004

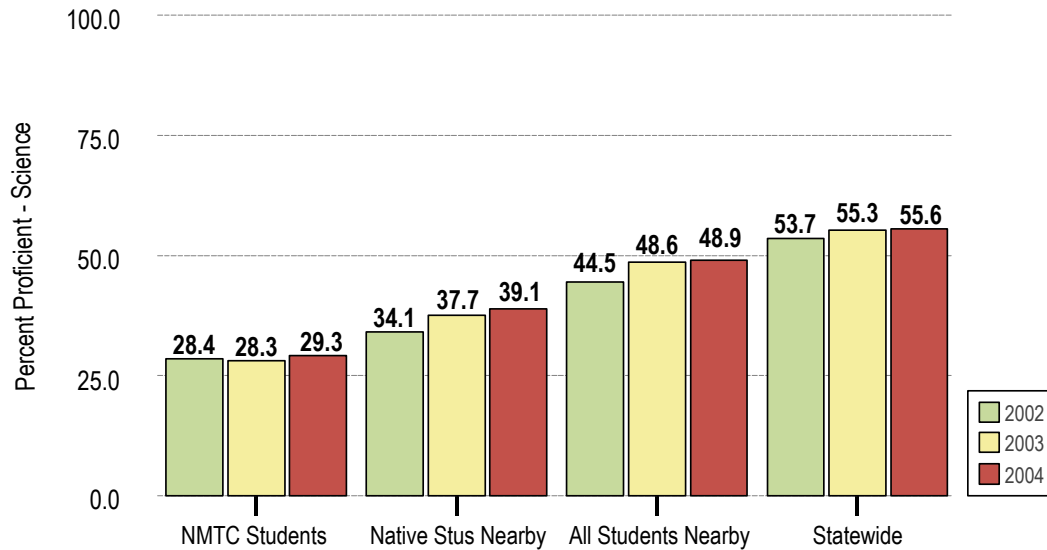
**PR greater than or equal to 40

Overall, the percent of NMTC students proficient in Mathematics was lower than all other groups each year with Native students nearby having the second lowest percent proficient for each reported year. Student in NMTC schools have made progress over the last three years in mathematics, at a slightly faster rate than native students in nearby schools, but still score lower than these students, as well as students statewide. Compared to Native students nearby, there was a 10 percentage point gap in 2002 and a 9 percentage point gap in 2004. When compared to all students statewide, there was a 28.2 percentage point gap in 2002 and a 25 percentage point gap in 2004.

Science

Figure 55 reports the percent of students proficient in science on the Terra Nova from 2002 to 2004 for the same four groups as reported in Figure 53.

Figure 55
Percent of Students* Proficient in Science**
Grades 3, 5, 6, and 7, 2002-2004



*graphic excludes 2 schools with missing data in 2004

**PR greater than or equal to 40

Overall, the percent of NMTC students proficient in science was closer to Native students nearby than the percent of students proficient in mathematics in 2002, yet was further apart in 2004. While the percent proficient in mathematics differed by 10 percentage points and 9 percentage points respectively in 2002 and 2004 between NMTC students and Native students nearby, the percent proficient in Science differed by 6 percentage points and 10 percentage points for the same years, depicting gains in mathematics and losses in science for NMTC students when compared to Native students nearby. While Native students nearby gained 5 percentage points in science proficiency from 2002 to 2004, NMTC students gained only 0.9 percentage points. All students statewide gained 1.9 percentage points from 2002 to 2004.

Involvement with the NMTC Approach

Figures 56 through 62 report various Terra Nova test results by a measurement of CENAC schools' involvement in the NMTC's approach to reform developed by the Evaluation Team using data collected by NMTC in 2003-04. This measurement, *Involvement with the NMTC Approach*, is meant to capture each school's level of participation in NMTC's reform efforts and coherence with the methods and philosophies promoted by NMTC. In order to account for the differing sizes of CENAC schools, the denominator of each component of the measure is the number of mathematics and/or science teachers in a school. Currently, the measurement includes three components (each meant to capture a different aspect of the NMTC's approach to reform) whose weights are shown by the percent in parentheses:

<p style="text-align: center;">Component 1: MST Leaders (40%) MST Leaders' Hours of PD / # Math and Science Teachers</p> <p style="text-align: center;">Component 2: Local Language (20%) # Math and Science Teachers that speak the local language / # Math and Science Teachers</p> <p style="text-align: center;">Component 3: Professional Development (40%) # Math and Science Teachers that participated in 20+ hours of PD / # Math and Science Teachers</p>
--

It is important to note that a Leadership component will also be added to this measure when data from the 2005 Mathematics and Science Student, Teacher, and Principal Surveys are ready for analyses. At that time, the *Involvement with the NMTC Approach* measurement will be recalculated and findings disseminated to NMTC. Figures 56 through 62 depict an overall trend of increased mean mathematics and science NCEs on the Terra Nova for schools with medium and high involvement. However, there are a few exceptions wherein a school with low involvement experienced increases in its mean NCE over time while a school with high involvement had a decrease. These inconsistencies are most likely a function of partial implementation of reform and the *Involvement with the NMTC Approach* not capturing critical factors at these schools, such as the leadership capacity of principals, etc. (a component which will be incorporated), or other influences which are more challenging to capture, such as community support of education and/or teacher ability to prepare students for standardized exams (the Evaluation Team is currently exploring ways of measuring these components).

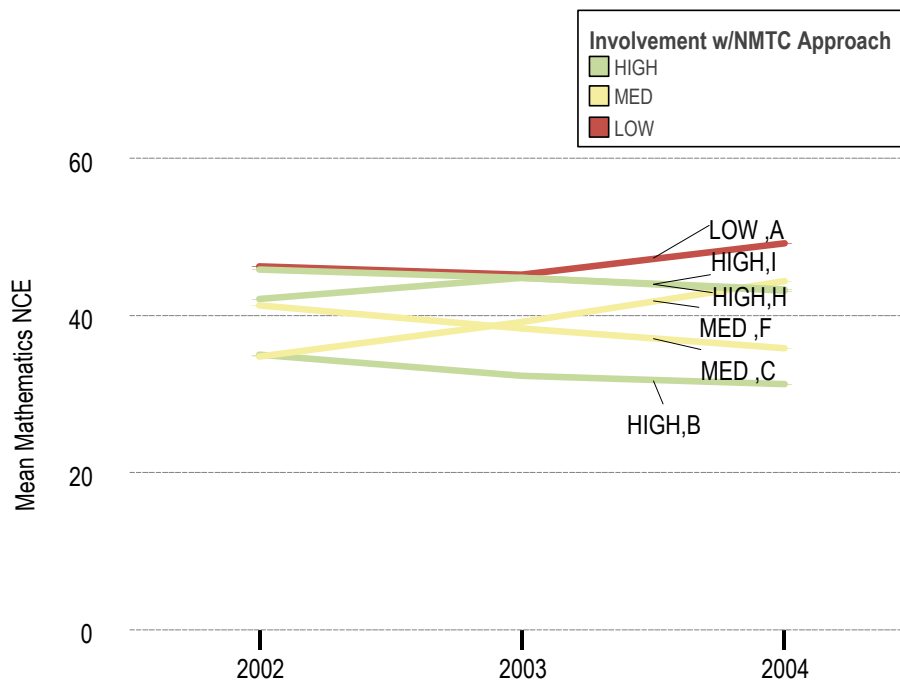
When raw scores on the *Involvement with the NMTC Approach* were calculated based upon the above formula, the highest raw score was 36, hence schools with 24 or more points were classified as "high", those with less than 24 points but 12 or more points were classified as "medium" and those with less than 12 points as "low". Figure 56 reports the NMTC *Involvement* Score and Level by School Code of the 12 NMTC Schools.

Figure 56
NMTC Involvement Score and Level by School Code
 (0 - 11 = “Low”, 12 – 23 = “Medium”, 24+ = “High”)

School Code	MST Leaders (40%)	Local Language (20%)	Professional Development (40%)	Raw Score	Level
A	3	20	7	8	Low
B	18	78	33	36	High
C	8	19	14	13	Medium
D	0	20	0	4	Low
E	4	15	0	5	Low
F	9	42	25	22	Medium
G	0	33	33	20	Medium
H	13	44	56	36	High
I	6	67	33	29	High
J	20	33	33	28	High
K	0	33	0	7	Low
L	10	30	10	14	Medium

Figure 57 reports grade 3 NMTC students’ mean NCE in mathematics from 2002 to 2004 by school and level of involvement with the NMTC approach for schools with 10 or more grade 3 students.

Figure 57
Mean Mathematics NCE for Grade 3 by School and Involvement with NMTC Approach 2002-2004

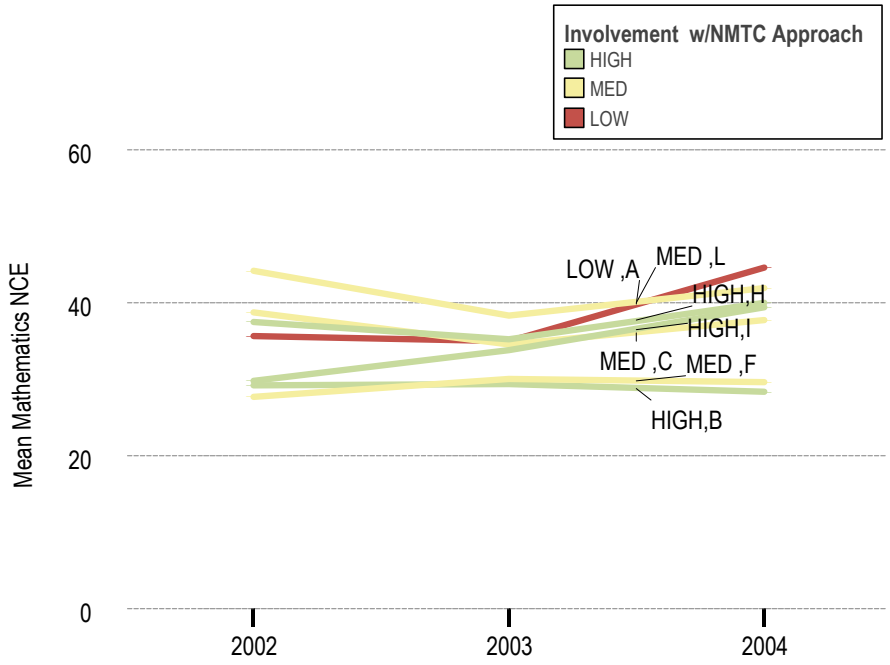


*Graphic excludes all schools with less than 10 students in grade 3 during any of reported years, as well as Taos, which was missing 2004 data.

Grade 3 mathematics NCEs from 2002 to 2004 reveals mixed performance across schools with similar levels of involvement. Two schools with high involvement experienced decreases in their mean NCE from 2002 to 2004 (I and B) while one experienced a slight increase (H). Of the schools with medium involvement, F's mean grade 3 mathematics NCE increased while C's decreased. The one school (A) with low involvement had an increase in mean NCE increased from 2002 to 2004.

Figure 58 reports NMTC grade 5 students' mean NCE in mathematics from 2002 to 2004 by school and level of involvement with the NMTC approach for schools with 10 or more grade 5 students.

Figure 58
Mean Mathematics NCE for Grade 5 by School and Involvement with NMTC Approach 2002-2004

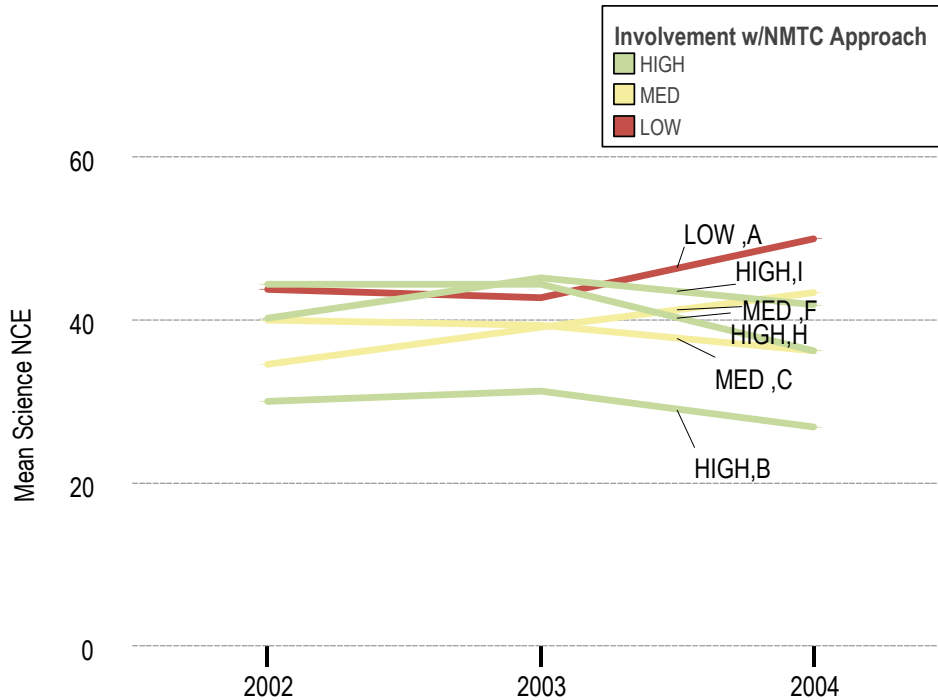


*Graphic excludes all schools with less than 10 students in grade 3 during any of reported years, as well as Taos, which was missing 2004 data.

Grade 5 mean mathematics NCE changes from 2002 to 2004 also revealed mixed results across involvement levels. Of the schools with high involvement, 2 of 3 (H and I), had increases in their mean NCEs. One of the schools with medium involvement (F) had an increase in its mean NCE from 2002 to 2004, while the school with low involvement (A) also had a mean NCE increase. It is interesting to note that grade 5 students in schools with a high involvement with the NMTC approach experienced gains in mathematics NCE more often than the group of grade 3 students from the same schools.

Figure 59 reports NMTC grade 3 students' mean NCE in science from 2002 to 2004 by school and level of involvement with the NMTC approach, for schools with 10 or more grade 3 students.

Figure 59
Mean Science NCE for Grade 3 by School and
Involvement with NMTC Approach
2002-2004

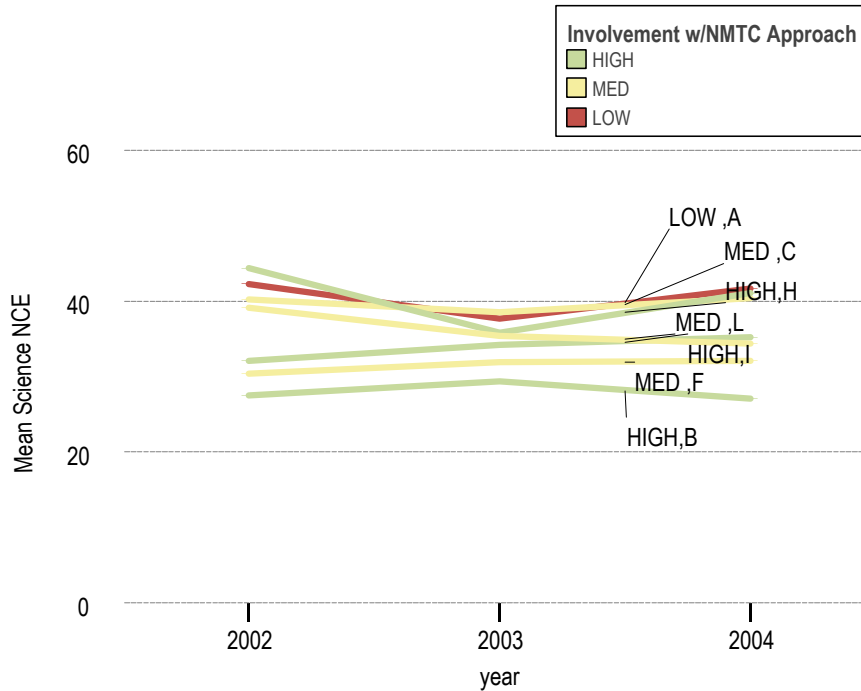


*Graphic excludes all schools with less than 10 students in grade 3 during any of reported years, as well as Taos, which was missing 2004 data.

Two of 3 schools with high involvement (B and H) had decreases in their grade 3 mean science NCEs from 2002 to 2004, while School I's increased. Of the schools with medium involvement, one experienced an increase in mean science NCE (F) while the other decreased (C). School A, low involvement, had a mean NCE increase from 2002 to 2004.

Figure 60 reports NMTC grade 5 students' mean NCE in science from 2002 to 2004 by school and level of involvement with the NMTC approach for schools with 10 or more grade 5 students.

Figure 60
Mean Science NCE for Grade 5 by School and
Involvement with NMTC Approach
2002-2004

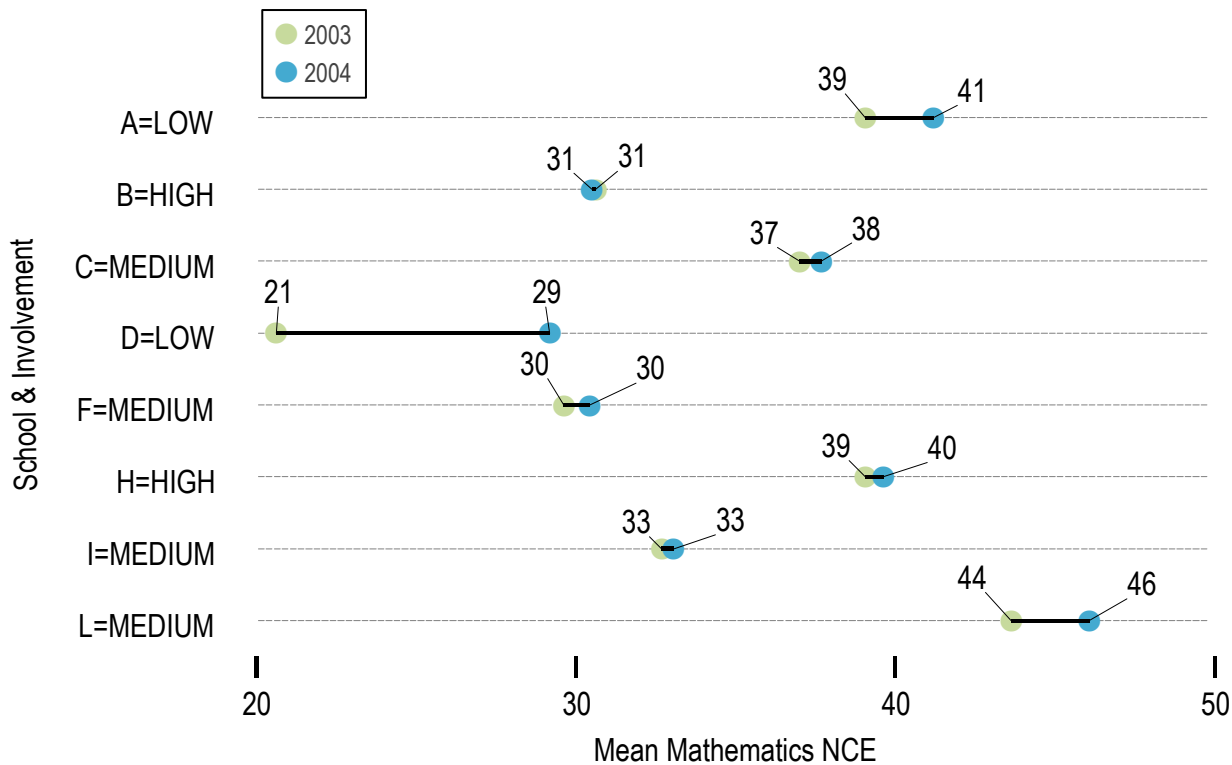


*Graphic excludes all schools with less than 10 students in grade 3 during any of reported years as well as Taos, which was missing 2004 data.

One high involvement school (I) had an increase in its grade 5 science NCE from 2002 to 2004 while the remaining two experienced decreases (B and H). Medium involvement schools, C and F, experienced an increase in their NCE from 2002 to 2004 while school L's (also medium involvement) decreased. The one school with low involvement (A) experienced a slight decrease from 2002 to 2004 in grade 5 science NCE.

Figure 61 depicts an unmatched cohort comparison of NMTC schools' mathematics NCE change between 2003 and 2004. This figure is utilized to examine the relationship between a school's involvement and the change in their mathematics NCE over one year. The mean NCE of students who were in grades 4, 5, and 6 in 2003 is compared to the mean NCE of students who were in grades 5, 6, and 7 in 2004 (as grades 4 and 8 were not tested in 2004, these students and their 2003 counterparts have been excluded).

Figure 61
One Year Unmatched Cohort Comparison
Between 2003 and 2004 Terra Nova Mathematics Mean NCEs*

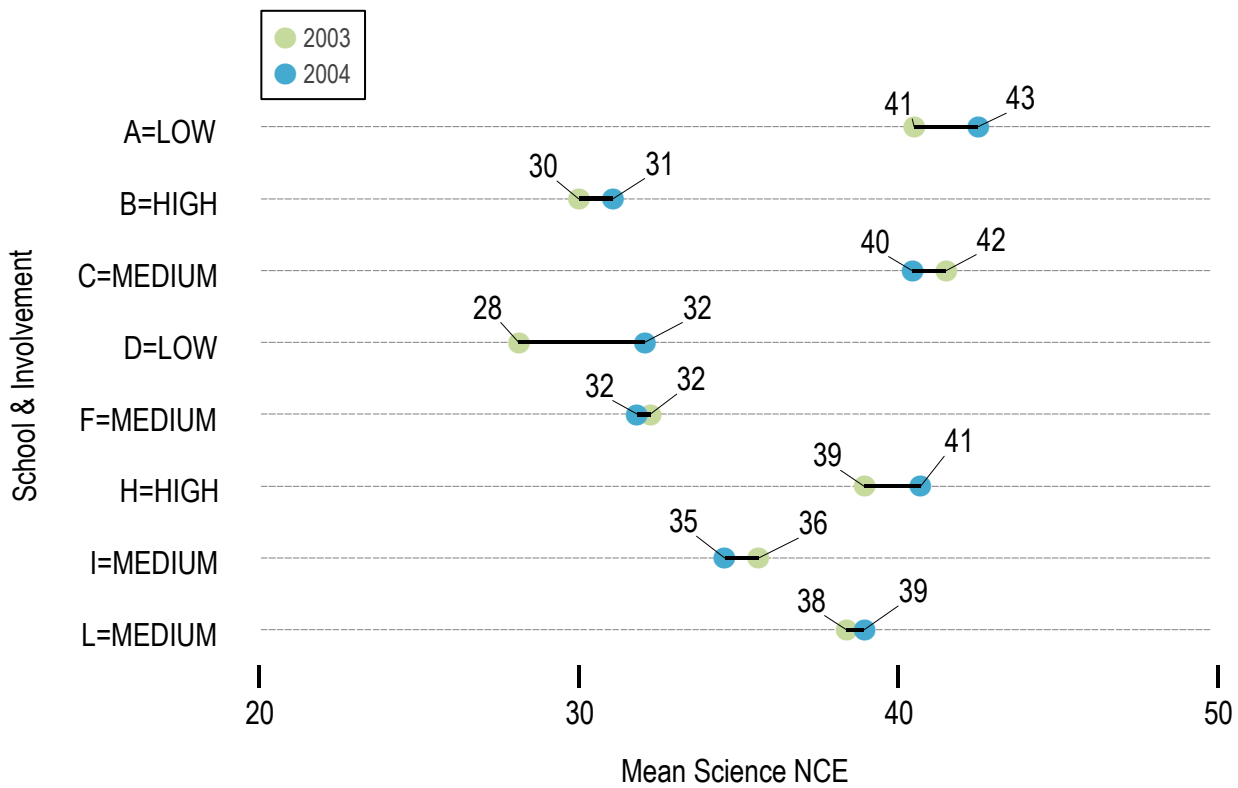


*Includes students in Grades 5, 6, and 7 in 2004 depending on grades serviced by each school. Please note that this graphic excludes schools with less than 50 students (San Ildefonso and Te Su Geh Oweengh) as well as Taos, which was missing 2004 data.

Between 2003 and 2004, all reported NMTC schools' mean mathematics NCE remained level or increased, based on the one year unmatched cohort comparison. School D (low involvement)'s mean mathematics NCE increased by 8 points (2003: 21; 2004: 29); however this is likely a function of a regression towards the mean. On the other hand, School L (medium involvement) experienced an increase of 2 points between 2003 (44) and 2004 (46), while both years having the highest mean mathematics NCE of any reported school. Mixed results based on involvement are again depicted by School A (low involvement) whose mean NCE increased by 2 points from 2003 (39) to 2004 (41). It is possible that differing rates of gain across involvement categories is a result of partial implementation of reform at schools.

Figure 62 depicts an unmatched cohort comparison of each school's mean science NCE change between 2003 and 2004. As in Figure 61, students who were in grades 4, 5, and 6 in 2003 are compared to students who were in grades 5, 6, and 7 in 2004.

Figure 62
One Year Unmatched Cohort Comparison
Between 2003 and 2004 Terra Nova Science Mean NCEs*



*Includes students in Grades 5, 6, and 7 in 2004 depending on grades serviced by each school. Please note that this graphic excludes schools with less than 50 students (San Ildefonso and Te Su Geh Oweengh) as well as Taos, which was missing 2004 data.

While all reported schools' mean NCE in mathematics remained level or increased, there were mixed results for these same schools in their mean science NCE from 2003 to 2004. As with mathematics, School D (low involvement) experienced a large increase in its mean science NCE (2003: 28; 2004: 32), again this was likely in large part caused by a regression towards the mean. Both schools with high involvement (B and H) had increases in their mean science NCEs (B: 2003: 30; 2004: 31; H: 2003: 39; 2004: 41). On the other hand, only one school with medium involvement (L) had an increase in its mean science NCE (2003: 38; 2004: 39). The remaining 3 schools with medium involvement (I, F, and C) had either no change or a decrease in their mean NCEs.

Chapter 3: Conclusions/Recommendations

NMTC has a unique relationship with the CENAC schools. Its liaison with CENAC has led to these entities becoming intertwined in a manner that leads to collaboration and shared governance of many projects. This partnership allows for policy concerns and mutual problems to be addressed collectively, often at CENAC meetings. Additionally, the NMTC staff members have created long-lasting and personal relationship with many principals and teachers, allowing for a great amount of impact and understanding. However, the Evaluation Team would like to make the following suggestions and recommendations to address specific areas of concern or potential challenges. As NMTC enters its last year of funding, the need to thoroughly review program progress and challenges becomes even more vital.

Revisit Program Goals

The end of NMTC's funding period is approaching rapidly and becoming a necessary reality for NMTC and CENAC to confront. First and foremost, NMTC should ensure that all program goals that have yet to be addressed are reconsidered and evaluated to determine their current viability and necessity. The two NMTC program goals, as defined in their proposal to the NSF, which have not been fully addressed by NMTC personnel include: "Collaborate with UNM, LANL, and others to implement standards based curriculum and assessment in every classroom based on results of the Implementation Matrix Measuring Progress in Reform" and "Support individuals from each school's participation in opportunities including WestEd Leadership Academy, FANS, and LASER". NMTC will benefit from reviewing the intent of these goals and determining their appropriate role in the program's future. Additionally, the following goals do not appear to have been fully addressed:

1. Recruit and Retain Quality Teachers: The improvement of mathematics and science in NMTC schools is heavily dependent upon recruiting and retaining quality teachers. NMTC has implemented a variety of measures geared at retaining quality teachers including extensive professional development, support from MST Leaders at many schools, and opportunities for involvement in programs like COOL. On the other hand, while individual schools may be utilizing effective methods of recruitment and induction of quality teachers, there is not an NMTC wide initiative. Increasing focus on recruitment and induction of quality teachers by researching effective, tested methods from other rural schools and individual CENAC schools is recommended. Furthermore, while the BIA's "Grow Your Own Program" is an option for CENAC teachers to further their professional development, it would be beneficial to increase teachers' awareness of this program and focus on helping teachers take advantage of these funds. SFIS has a model program wherein tuition is paid for teachers who are required to remain at SFIS for a time equal to their enrollment. While the SFIS is unique in many ways from the other NMTC schools, similar programs could be initiated at the other CENAC schools if NMTC and CENAC deem this important.

2. Increase Communication with the BIA Center for School Improvement: Resource convergence is a primary goal in the NMTC's plan to improve mathematics and science education for its students. NMTC utilizes CENAC meetings and MST Leaders to ensure that resources are shared across the NMTC schools. The Partner's Council provided external resource convergence, though its limited success ended in its termination. Additionally, NMTC's proposal included plans to develop specific strategies with the BIA Center for School Improvement (formally the BIA School Reform Center) to address resource convergence. While communication exists between NMTC and the BIA Center for School Improvement, no development of specific strategies or plans to collaborate on strategies currently exist. As there appear to be no specific reasons for these setbacks, it would be beneficial for NMTC to initiate communication with the BIA Center for School

Improvement in order to move forward regarding this goal, if it is still deemed important by NMTC personnel and its partners.

Address Sustainability of Selected Program Components

Program components that CENAC would like to focus on sustaining should be identified soon so that further action may be taken to assure continuation of these programs through grant writing. NMTC should collaborate with CENAC and other appropriate parties, using CENAC meetings or focus groups, to identify programs that the group would like to continue when NMTC funding has ended.

Once a group of programs that CENAC would like to focus on sustaining have been identified, NMTC may wish to explore a number of approaches to program extension. The NMTC database, a valuable source of diverse program information, along with other data collected by NMTC, could be utilized to develop detailed school profiles. These profiles would provide NMTC with extensive, concrete data for grant writing, both in establishing the successes of the NMTC and in supporting proposal ideas. When identifying potential funding sources, it may be helpful for NMTC to keep in mind the new State Dept assistant secretary of Indian education while exploring funding opportunities.

During the process of selecting NMTC programs to focus upon sustaining, the Evaluation Team recommends that the following program be considered:

1. The CENAC Science Fair: The science fair has been a very successful endeavor, bringing together CENAC students, teachers, and parents once a year so that students may compete in a regional science fair that emphasizes Native science. There is currently no funding in place to support the science fair at the completion of the current NMTC. It is recommended that the NMTC explore collaborating with past judges to create a grant proposal. A great source of support for the proposal is the extensive data collected on past science fairs.

2. The CENAC Rally: The CENAC Rally has also been a highly effective event, which has allowed CENAC staff members to annually receive extensive, targeted professional development and to connect with one another. As with the science fair, the Evaluation Team recommends that NMTC explore creating a grant proposal for the continuation of the CENAC Rally.

3. Brain 101 and NABS: The NMTC database, along with teacher and MST Leader interviews, reveal that Brain 101 and NABS have been two of the most popular and well attended NMTC professional development trainings. Interviewed MST Leaders and teachers reported that they experienced notable impacts on their conceptions of student learning and their instructional strategies as a result of attendance. Given the overwhelming positive reception of teachers to these courses, it is recommended that continuing these trainings through a grant proposal be considered.

Clean and Update the NMTC Database

While much valuable data has been collected by the NMTC on participation in professional development, participants' demographics and background information, challenges still remaining in ensuring complete and accurate data collection. A number of data collection inaccuracies have been identified by NMTC, including missing staff profiles, incorrect data (though very limited and mostly attributed to data entry errors), and incomplete professional development data. These difficulties ensuring that the database is "clean" have been ongoing, creating frustration for NMTC personnel. In November of 2004, the NMTC's research assistant who managed the database accepted another position at the SFIS. A new research assistant was recently hired. This presents a unique opportunity for NMTC to ensure a new system of data entry and management is established to

address their concerns. Once the new hire has been trained, NMTC would greatly benefit from an extensive review of their database resulting in a plan for “cleaning” the database and implementing new strategies to prevent similar challenges.

Target Subgroups of Teachers with Professional Development

NMTC’s Professional Development is meant to increase participants’ knowledge and comfort level with various types of mathematics and science instruction. Self-reported data on comfort level in teaching mathematics and science from the Content Standards Surveys indicates that teachers are experiencing impressive gains in comfort levels teaching math and science. Additionally, these surveys reveal that responding teachers with 7 to 15 years of experience tended to make more significant gains across the years in their comfort teaching mathematics and science content than responding teachers with more than 15 years experience and responding teachers with 1 to 6 years experience. On the other hand, the group of teachers with 15 or more year teachers experience was the largest group across all years, indicating that this sample represents a large population within NMTC. Hence, NMTC may benefit from further investigations into methods of impacting these three groups of teachers with different professional development needs that takes into account the unique characteristics of these group of teachers and any associated challenges with increasing their comfort levels teaching mathematics content. Additionally, NMTC may wish to involve MST Leaders in this endeavor by utilizing them to identify school-specific needs and/or to provide teacher groups at their schools with Indirect Professional Development.

Focus on Including Native Ways in Mathematics

NMTC teacher interviews and document reviews revealed that there appears to be more emphasis on the inclusion of Native Ways in science professional development training (such as NABS) than in mathematics professional development trainings (such as MathLand and the Summer Math Courses). Interviewed teachers who had attended mathematics content and instructional strategies trainings reported less emphasis on Native Ways at these trainings than at science trainings. Furthermore, regardless of what trainings they had attended, many teachers reported less comfort including Native Ways in their mathematics instruction than in their science instruction. Given this divide between integrating Native Ways in science and math, it would be beneficial for NMTC to examine the content of mathematics professional development trainings in order to incorporate a greater emphasis on helping teachers to incorporate Native Ways into their mathematics curriculum. NMTC teachers are using a number of effective strategies for including Native Ways in science; it is likely that many of these strategies can be considered for mathematics professional development trainings as well.

Place Equal Emphasis on Mathematics and Science Success

The extent of NMTC’s impact on student achievement is depicted through changes in test scores across time by comparison to Native students nearby, all students nearby and all students statewide. The gap between NMTC students and Native students nearby (as depicted by percentile rankings greater than or equal to 40) widened in science and closed very slightly in mathematics between 2002 and 2004. In order to “close the gap” between NMTC students and Pueblo students nearby, mathematics and science need to take the same precedence within the NMTC program goals given the fluctuation in achievement compared to Native students nearby. As the program continues, student test scores are more likely to begin reflecting the positive effects already seen through data sources such as the Content Surveys, teacher interviews, and principals’ questionnaires.

Help Schools Change their Outlook on Standardized Exams

While schools with high and medium *Involvement with the NMTC approach* (as measured by the scale developed by the Evaluation Team) show great amounts of enthusiasm towards NMTC's philosophies and programs, some of these schools are not experiencing growth in standardized exam scores. The Evaluation Team is continuing work on increasing the components utilized in the *Involvement with the NMTC approach* in order to capture as many influences on schools involvement as possible. However, it is also likely that students' test scores are increasing at variable rates across Involvement classifications as a result of partial implementation of reform in schools. While standardized test scores are not the only measurement of success, they are critical in many policy and funding decisions. Hence, NMTC would benefit from helping schools change their outlook on standardized exams utilizing some of the following strategies:

1. Professional Development for Teachers: NMTC may want to introduce professional development trainings that assist teachers in preparing their students to succeed on standardized exams by providing teachers with insight on the exams' content, test taking strategies, etc. Furthermore, trainings could be used to encourage teachers to view their students' test scores as important measurements in evaluating their teaching, their students abilities, and their school as a whole.

2. Motivational Methods for Students: Students also need to realize the important role that standardized exams play in their academic life in a manner that encourages them to "put their best foot forward" when taking exams. NMTC may wish to explore methods of motivating students to do their very best on standardized exams. At Santa Clara, an event is held which may provide NMTC with a model to introduce to other CENAC schools. This event introduces students to succeeding on exams by doing things like ensuring sleep and eating well, as well as other strategies.

3. School Involvement in New Mexico Exam Development: CENAC schools have faced a number of challenges in ensuring that their students' standardized exam scores fully reflect their knowledge. Research by WestEd has shown that exams questions can include information and language use that is unfamiliar to Native students as well as concepts that Native Students find confusing. In order to best represent CENAC students, the Evaluation Team recommends that representatives from CENAC schools, including teachers and administrators, become involved in the development of standardized exams in New Mexico. When considering methods of reforming standardized exams to be attentive to Native ways of knowing, CENAC representatives may want to review the Alaska Department of Education's methods of including Native knowledge and culture in standardized exams.

4. Instructional Hours Prior to Exams: Additionally, NMTC should further its investigation of the hours of instruction students in NMTC schools receive prior to taking standardized exams compared to New Mexico public school students. There is a strong possibility that NMTC students are missing critical instructional time compared to their public school counterparts prior to these exams.

The above 4 components would require extensive work and involvement on the part of NMTC personnel. Furthermore, it is likely that full implementation of these methods would not be possible prior to the end of NMTC funding. Therefore, it may benefit NMTC personnel to consider writing a grant proposal to extend this work beyond the NMTC funding period.

Concluding Remarks

NMTC is in the midst of a critical journey to ensuring the establishment of a standards-based and inquiry centered mathematics and science education for the students it services. The strong partnerships and collaborations that have been established by NMTC have and will continue to support its ability to impact all learners by ensuring high quality mathematics and science. Furthermore, the numerous, in-depth programs established by NMTC provide the capacity to directly impact policy and practice in the schools it services. As the program moves toward the end of its funding, these endeavors will continue to help support the NMTC and positively impact its ability to sustain success in CENAC schools after its completion.