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November 13, 2013

MEMORANDUM

TO: Legislative Education Study Committee

FR: Frances Ramírez-Maestas

**RE: COMMITTEE REQUEST: LOS ALAMOS NATIONAL LABORATORY
NORTHERN NEW MEXICO MATH AND SCIENCE ACADEMY (MSA)**

During the August interim meeting of the Legislative Education Study Committee in Chama, a committee member requested additional information about the Los Alamos National Laboratory (LANL) Math and Science Academy.

In response to this request, attached is a three-page summary and a reference page sent by LANL staff.

Los Alamos National Laboratory Northern New Mexico Math and Science Academy (MSA)

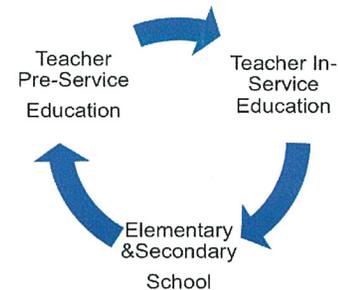
(As requested by Legislative Education Study Committee on August 19, 2013, Chama Middle School Meeting)

MSA is an intensive and comprehensive professional development (PD) program grounded in Standards-Based Education principles for K-12 teachers and principals.

Participants commit to attend a **two-week Summer Institute** for three years, during which they study best practices in **curriculum, instruction/learning theory, assessment, classroom management, data analysis and decision-making**.

For teachers of mathematics to be effective, they require lots and lots of training and practice. **MSA delivers about 85 hours of PD per year** for teachers via summer institutes, math institutes, and coaching.

Figure 1. Three periods during which teachers' subject matter knowledge develops.



Liping Ma, 1999. p. 145)

Since 2000, the MSA program has worked extensively with northern New Mexico public school teachers and principals, particularly schools with highly diverse student populations.

Also, MSA has partnered with higher education institutions to deliver master's- and doctor's-level programs:

- New Mexico State University Master's in Teaching Mathematics and Science (**57 teachers received master's degrees** between 2005 and 2009).
- Today, **eight northern New Mexico MSA educators** just completed UNM Ed.D./MSA Leadership Doctoral course work; and are now in the dissertation phase of the program.
- **Six Bureau of Indian Education (BIE) teachers** are enrolled in the **UNM/MSA Master's in Educational Leadership** with emphasis in differences and similarities between Native and Western ways of understanding.

Northern New Mexico Public School Partners

- Chama Valley Independent Schools (K-8)
- Taos Municipal Schools (K-6)
- Española Public Schools (K-12)
- Mora Independent Schools (K-6)

Bureau of Indian Education Pueblo Schools:

- Ohkay Owingeh Community School (Grant School)
- T'siya Pueblo Day School
- San Felipe Day School
- Jemez Day School

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Essential Components of MSA Teacher Professional Development Program That Contribute to Success of MSA Program: MSA Best Practices	
Two-week MSA Summer Institute and at least four times a year, MSA staff meets with teachers individually for a three-part instructional coaching session (Plan, Observe, Feedback) (about 70 hours)	<p>The 2012-13 end-of-the year follow-up survey shows a strong connection between teacher change in instructional practices and coaching. Approximately, 89% of the teachers surveyed selected the “A Moderate Change” and “A Large Change” categories to the question “To what extent has MSA coaching led to changes?”</p> <p>The REL “report finds that teachers who receive substantial professional development—an average of 49 hours in the nine studies—can boost their students’ achievement by about 21 percentile points” (REL, 2007, p. iii)</p>
One-week Science-Inquiry and Content Training (about 33 hours)	Ninety-five percent of 26 MSA participants in a one-week science training session strongly agree that the science content they learned at the 2013 Science Leadership Institute will make them more effective as an instructional coach or teacher in the coming year.
Math Writing Workshop & Science Notebooking (About 15 hours)	“Writing extended texts . . . is a major cognitive challenge, even for professionals. . . . Serious writing is at once a thinking task, a language task, and a memory task.” (Kellogg, 2006)
One-week Math Content Session & Ir-Rational Number Institutes (About 85 hours)	<p>“Acquiring intuitive math skills requires:</p> <ul style="list-style-type: none"> • An environment that is sufficiently regular to be predictable • An opportunity to learn these regularities through prolonged practice” (Kahneman, 2011, p. 240) <p>“Five characteristics that seem to distinguish the [math] prodigies:</p> <ul style="list-style-type: none"> • The accuracy and ‘rapidity’ of memory, ‘arithmetical association’ (knowing lots of arithmetical facts and procedures), inclination, mathematical precocity, and ‘imagination’ (visual imagery)” (Butterworth, 2006, p. 554).
Budget Adequate for compensating teachers and administrators beyond their yearly contract as well as covering cost of instructional, material resources, and higher ed. tuition.	Presently, our BIE partner schools extend teacher and principal contracts to cover the teachers’ and principals’ participation in the two-week MSA Summer Institutes, MSA Math & Science weeks, the eight Ir-Rational Number Institute sessions, MSA Day, and one-week Science Leadership Content Training per year, as well as half the higher education tuition.

The overarching goal of MSA is to provide comprehensive math and science professional development for teachers and school leaders to ensure mathematics and science learning of the highest quality for all students.

Diverse Student Population in one Northern New Mexico Public School Grades 3rd-5th

NMSBA Math Proficient & Above 2005-2013
 N= mean 106, range 101-113

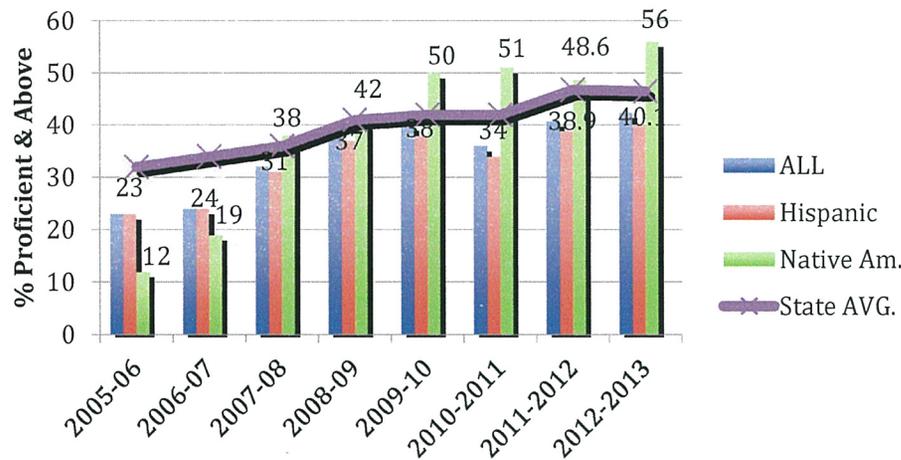


Figure 2. The MSA program has worked extensively with northern New Mexico public schools teachers and principals, particularly schools with diverse student populations. Native American student achievement in mathematics at San Juan Elementary School, Española Public School District, has **increased 44 percentage points over seven years and for five years has exceeded New Mexico averages.**

In addition, Hispanic students NMSBA Proficiency scores **increased from 23% to 40.1%** during the same time period.

The difference in scores is attributable to before/after school tutoring program funded by Ohkay Owingeh Pueblo, as well most of staff and principal were MSA trained, and used of reform math curriculum.

References

- Butterworth, B. (2006). *Mathematical Expertise* in Ericsson, K. A., Charness, N., Feltovich, P.J., and Hoffman, R.R. (Eds.), *The Cambridge Handbook of Expertise and Expert Performance*. (pp. 553-568). New York.: Cambridge University Press.
- Kahneman, D. (2011). *Thinking, Fast and Slow*. New York, New York: Farrar, Straus and Giroux.
- Kellogg, R. T. (2006). Professional writing expertise. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge Handbook of Expertise and Expert Performance* (pp. 389-402). New York: Cambridge University Press.
- Ma, L. (1999). *Knowing and teaching elementary mathematics: Teachers understanding of fundamental mathematics in China and the United States*. Mahwah, NJ: Erlbaum
- Yoon, K. S., Duncan, T., Lee, S. W.-Y., Scarloss, B., & Shapley, K. (2007). *Reviewing the evidence on how teacher professional development affects student achievement* (Issues & Answers Report, REL 2007–No. 033). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest. Retrieved from <http://ies.ed.gov/ncee/edlabs>