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Development: Ir-Rational Numbers Institute

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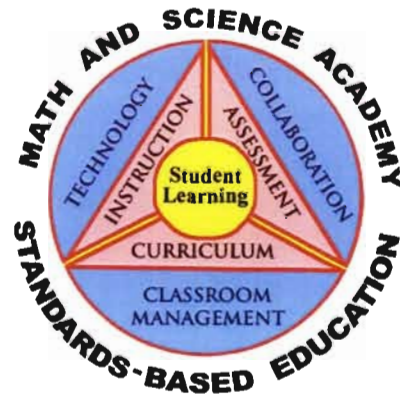
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New Paradigms in Grades K-12 Mathematics Professional Development Ir-Rational Numbers Institute



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LANL Math and Science Academy Team



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Los Alamos National Laboratory
Math and Science Academy

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LANL MATH & SCIENCE ACADEMY: A 3-YEAR TEACHER DEVELOPMENT PROGRAM



Summer Institute

- 2-WEEK CORE PROGRAM IN PEDAGOGY, BRAIN-BASED LEARNING, ASSESSMENT, STUDENT ENGAGEMENT
- 1- WEEK OF MATH OR SCIENCE CONTENT



During School Year

- 2 MSA "teacher share" days
- Classroom coaching in math and science

MSA FISCAL PARTNERSHIPS

Major Financial Support from:

- Los Alamos National Security LLC
- Española Public Schools
- LANL Foundation
- Chevron Corporation
- Northern New Mexico College

MSA Core Principles: Standards-Based Education

Conceptual and discovery-based pedagogy

Instruction



Formative and common assessments written by teachers in PLCs



Assessment

Guaranteed, viable, standards-based curriculum



Curriculum

Problems common in teacher professional development:

- No specific link between curriculum and content knowledge and pedagogical techniques
- Programs not long enough to help teachers develop sufficient depth in content knowledge

To increase chances of success:

$$\begin{array}{l} \text{SUSTAINED PD in MATH \& SCIENCE CONTENT} \\ + \\ \text{GUARANTEED, VIABLE MATH \& SCIENCE CURRICULUM} \\ \hline = \text{DEEP LEARNING OF INSTRUCTIONAL STRATEGIES } \mathbf{PLUS} \\ \text{CONTENT} \end{array}$$

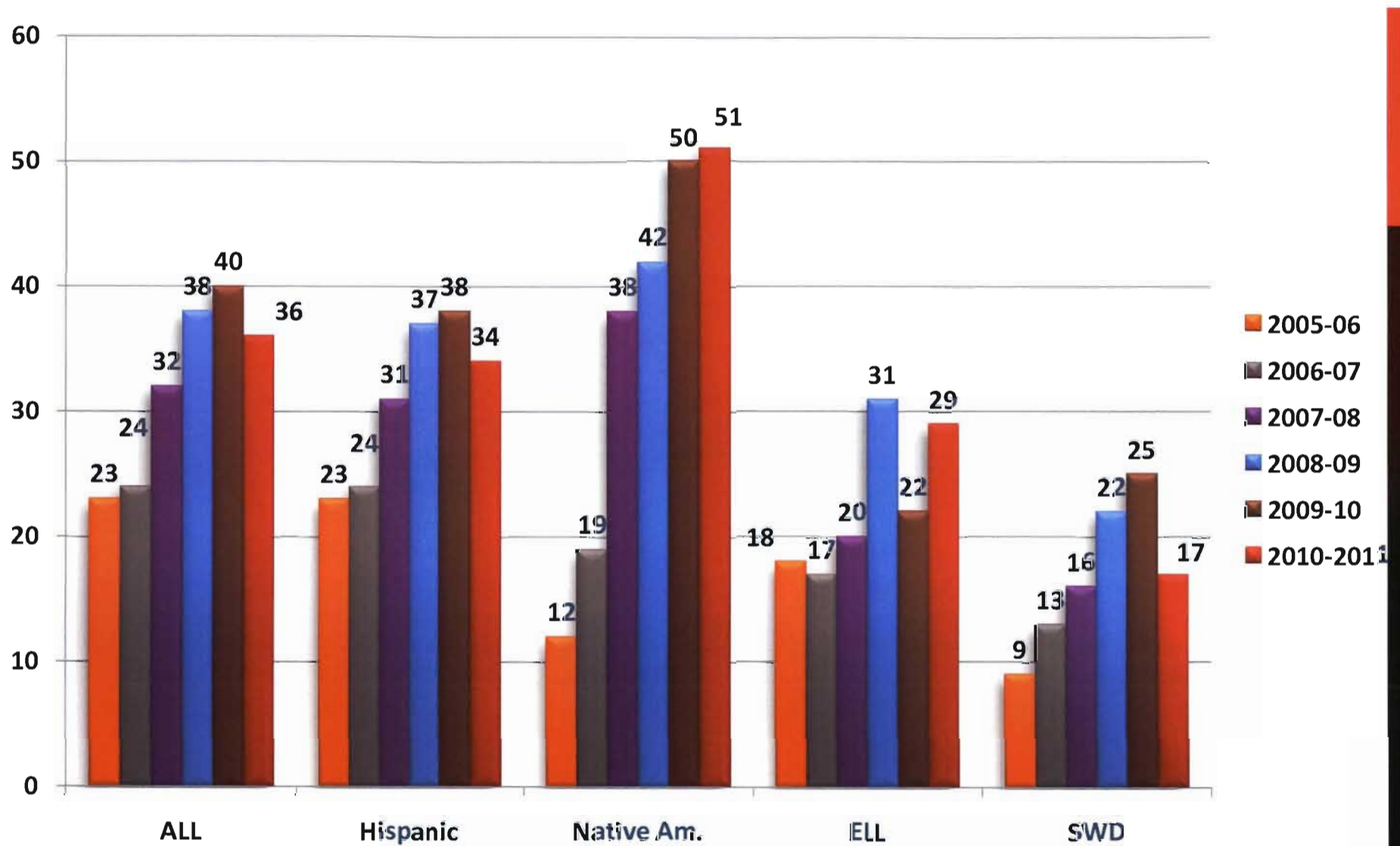
OUR EDUCATIONAL PARTNERSHIPS

2000-2007:

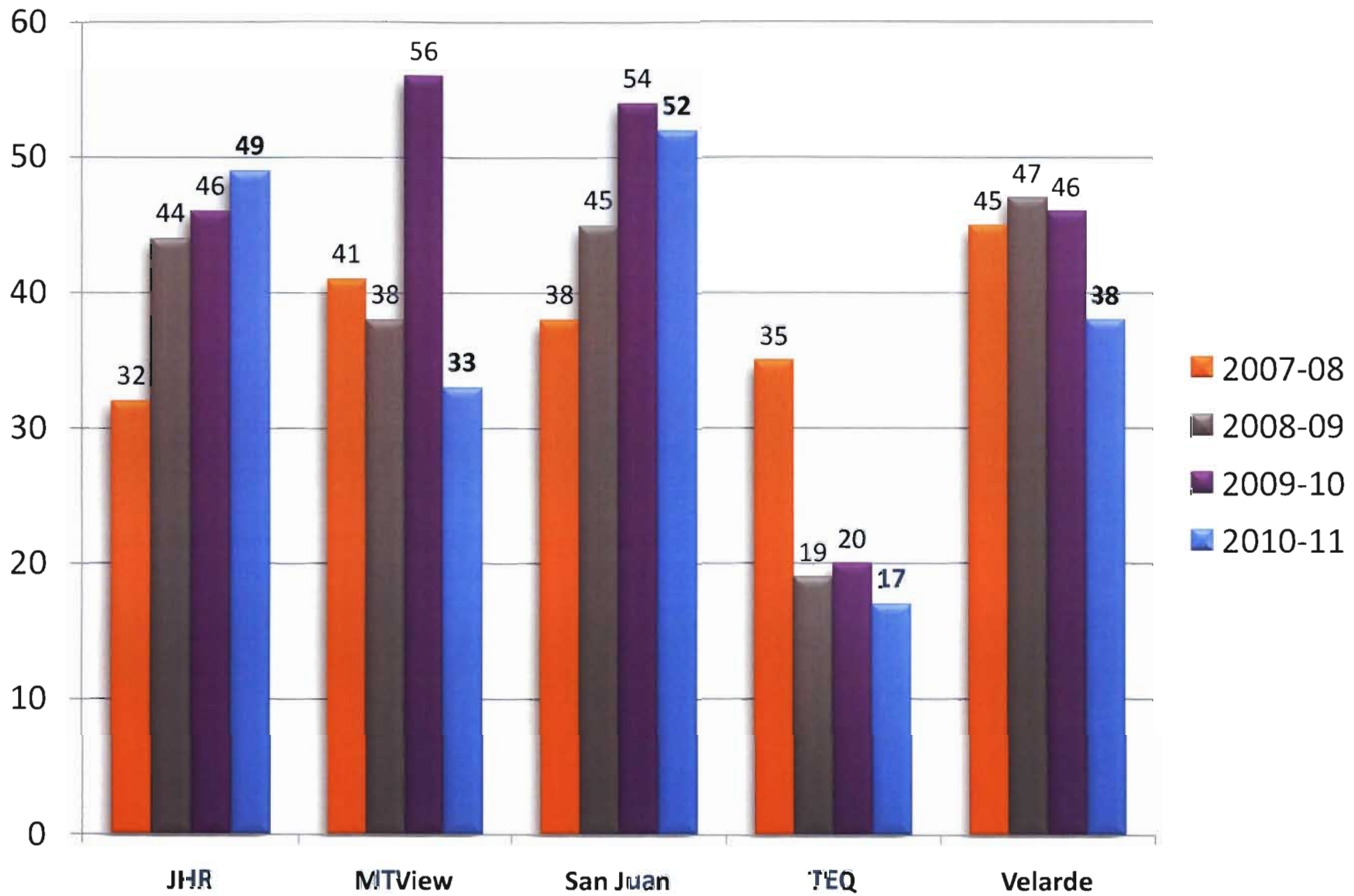
- **5 Northern NM school districts** (Chama, Española, Mora, Pojoaque, and Taos)
- **New Mexico State University**, MC² (Drs. Karen Wiburg, Cathy Kinzer, and Ms. Wanda Guzman)
- **UNM** (Dr. Rick Kitchen)

2007-PRESENT: DISTRICT AND HIGHER EDUCATION PROGRAMS

- **Española Public Schools** Math Initiative
- **Inquiry Science Initiative** with Española, Taos school districts
- **UNM Ed.D.** Doctorate in Rural Leadership and Math Education
- **UNM M. A.** (Proposed) In Rural/Native American Leadership



**ESPAÑOLA PUBLIC SCHOOLS
NMSBA 2005-2011 MATH
DISTRICT-GRADES 3-5
PERCENT PROFICIENT**



**ESPAÑOLA PUBLIC SCHOOLS
NMSBA 2007-2011-MATHEMATICS
PERCENT PROFICIENT BY SCHOOL**

LEARNED ABOUT MATH & SCIENCE TEACHER DEVELOPMENT

- ➔ Teacher reform takes considerable **time** (3 to 5 years minimum)
- ➔ Education must be in not just pedagogy, but also sci-math **content**
- ➔ Best results are achieved with math and science **conceptual education**, not just 'training' in methods or techniques
- ➔ **Teachers must understand** sci-math concepts in order to teach them to students.



A PROFESSIONAL DEVELOPMENT PARTNERSHIP BETWEEN MSA AND ESPAÑOLA PUBLIC SCHOOLS

The MSA Ir-Rational Number Institute					
Semester	Number of Participants	Number of Days	Districts	Subject	Grade Levels
Spring 2009	26	4.5	Española, Pojoaque	Fractions	K-12
Fall 2009	35	4.5	Española, Chama Valley	Algebra as Generalized Arithmetic	K-12
Spring 2010	34	4.5	Española, Santa Fe, Capitan	Estimation of Measures and Development of Benchmarks	
Fall 2010	61	4.5	Española, Chama Valley, Pojoaque, Taos	Multiplicative Thinking: Fractions, Decimals and Percent	K-12
Spring 2011	46	4.5	Española, Pojoaque, Taos	Data Analysis and Probability/Mathematics Writing	

**LET'S DO SOME MATH
PROBLEMS!**