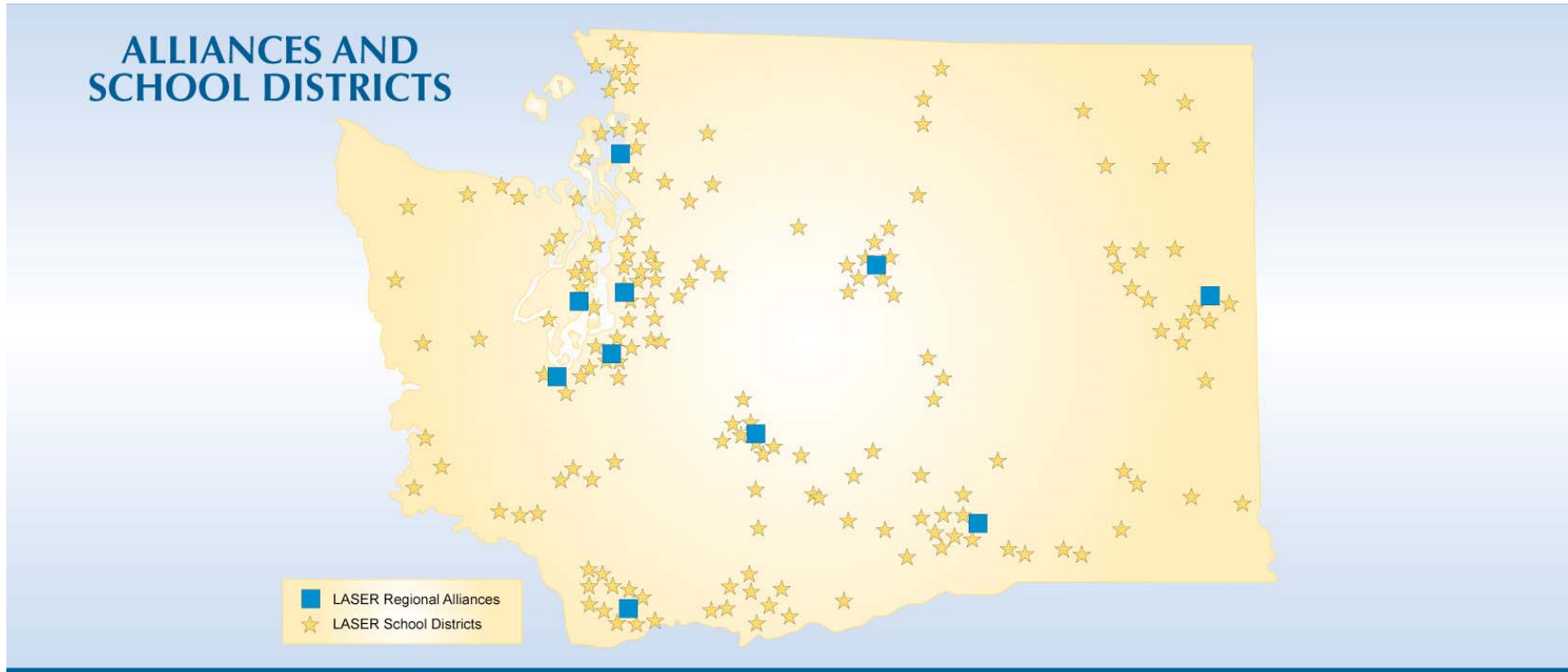


# *Washington State LASER: What We Know About Its Impact on Students*

*4<sup>th</sup> International Conference  
Science and Well-being: From Amazement  
to Citizenship  
Monterrey, Mexico  
November 9, 2007*

*Louise Fayette, Washington State LASER*

# South Central Alliance is One of the Ten Alliances in Washington State



Washington State Office of  
**Superintendent of Public Instruction**  
and its Education Service Districts



**National Science Resources Center**  
THE NATIONAL ACADEMIES Smithsonian Institution



**Pacific Northwest National Laboratory**  
Operated by Battelle for the U.S. Department of Energy

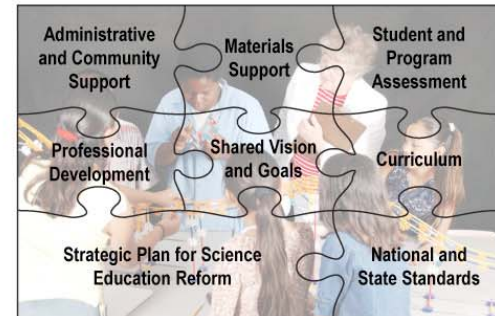


**Agilent Technologies Foundation**

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The Business of Innovation



**ROSETTA INPHARMATICS**  
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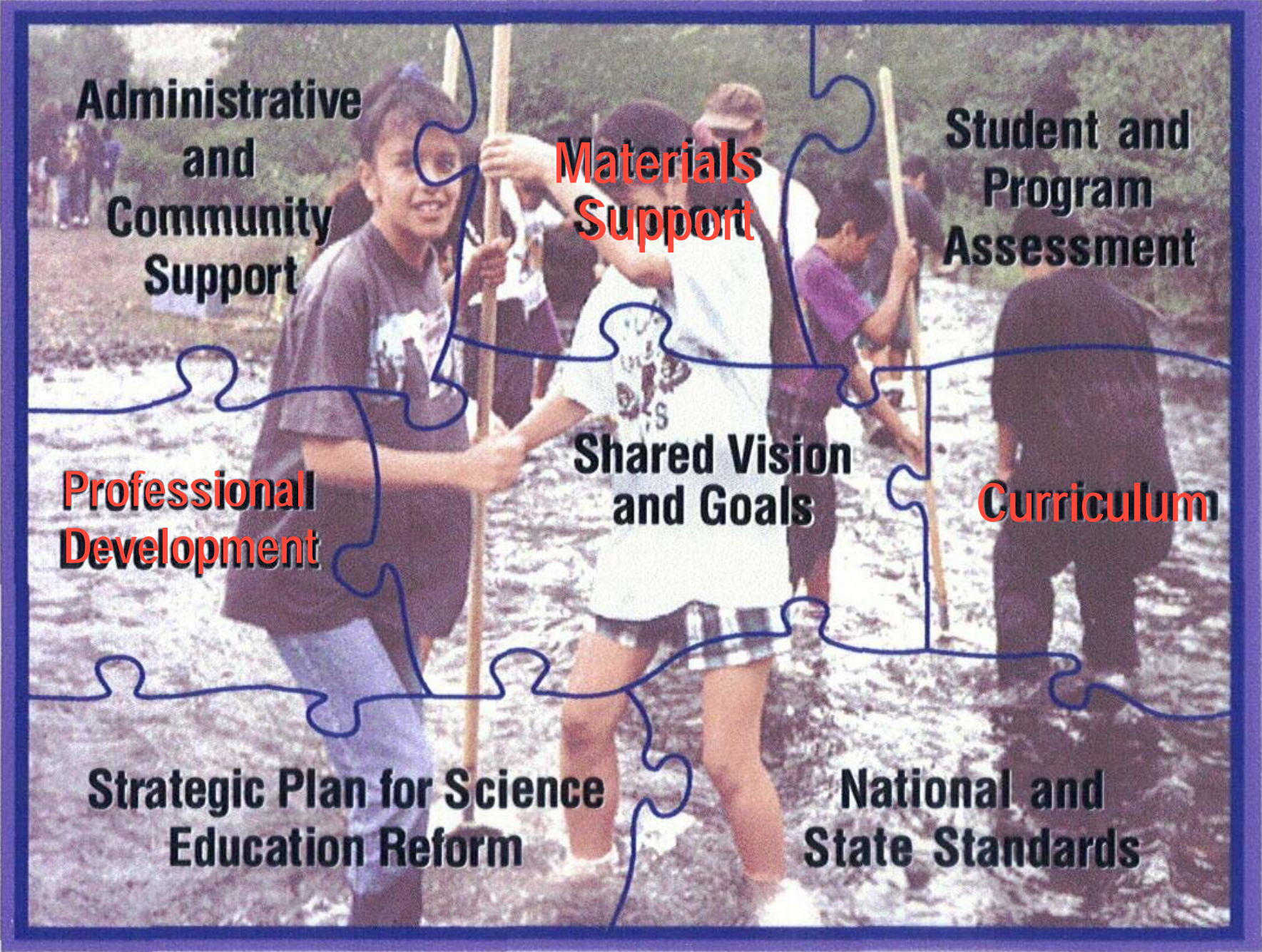
November 2007



# South Central Alliance

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- ❑ 22 School Districts and 2 Private Schools in partnership with ESD 105
- ❑ 1200 elementary teachers (K-6)
- ❑ 30,000 elementary students
- ❑ Demographics:
  - ❑ 65% Poverty
  - ❑ 50% Hispanic
  - ❑ 60% of WA migrant students are located in our area



**Administrative  
and  
Community  
Support**

**Materials  
Support**

**Student and  
Program  
Assessment**

**Professional  
Development**

**Shared Vision  
and Goals**

**Curriculum**

**Strategic Plan for Science  
Education Reform**

**National and  
State Standards**

Physical Science

Earth Science

Life Science

<b>K</b>			<b>LIFE CYCLE OF BUTTERFLIES</b>
<b>1</b>	<b>SOLIDS &amp; LIQUIDS</b>	<b>WEATHER</b>	<b>COMPARING &amp; MEASURING</b>
<b>2</b>	<b>BALANCING &amp; WEIGHING</b>	<b>SOILS</b>	<b>ORGANISMS</b>
<b>3</b>	<b>CHEMICAL TESTS</b>	<b>ROCKS &amp; MINERALS</b>	<b>PLANT GROWTH &amp; DEVELOPMENT</b>
<b>4</b>	<b>ELECTRIC CIRCUITS</b>	<b>LAND &amp; WATER</b>	<b>MICROWORLDS</b>
<b>5</b>	<b>FOOD CHEMISTRY</b>	<b>MOTION &amp; DESIGN</b>	<b>ECOSYSTEMS</b>
<b>6</b>	<b>FLOATING &amp; SINKING</b>	<b>MAGNETS &amp; MOTORS</b>	<b>EXPERIMENTS WITH PLANTS</b>

# Professional Development

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## Trainings

- ❑ 2-Days/12 hours on all modules for Initial Use
- ❑ 1 Science Content Day
- ❑ Further Science Notebook Training
- ❑ WASL Workshops



# Materials Support: *Science Resource Center*

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*What DO We Know About  
WA State LASER's Impact  
on Students?*

# *2004 School-Level Study*

## Using School-Level 2004 Grade 5 Science WASL Results

# Our Hypothesis

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Intensive professional development on the implementation of coherent, inquiry-based K-5 science curriculum materials will have a positive impact on the student achievement in science

# The Bottom Line . . .

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- **Yes!** There is solid evidence to support this hypothesis
- Research conducted over 3 years in 4 separate studies

# Used Existing Data Sources

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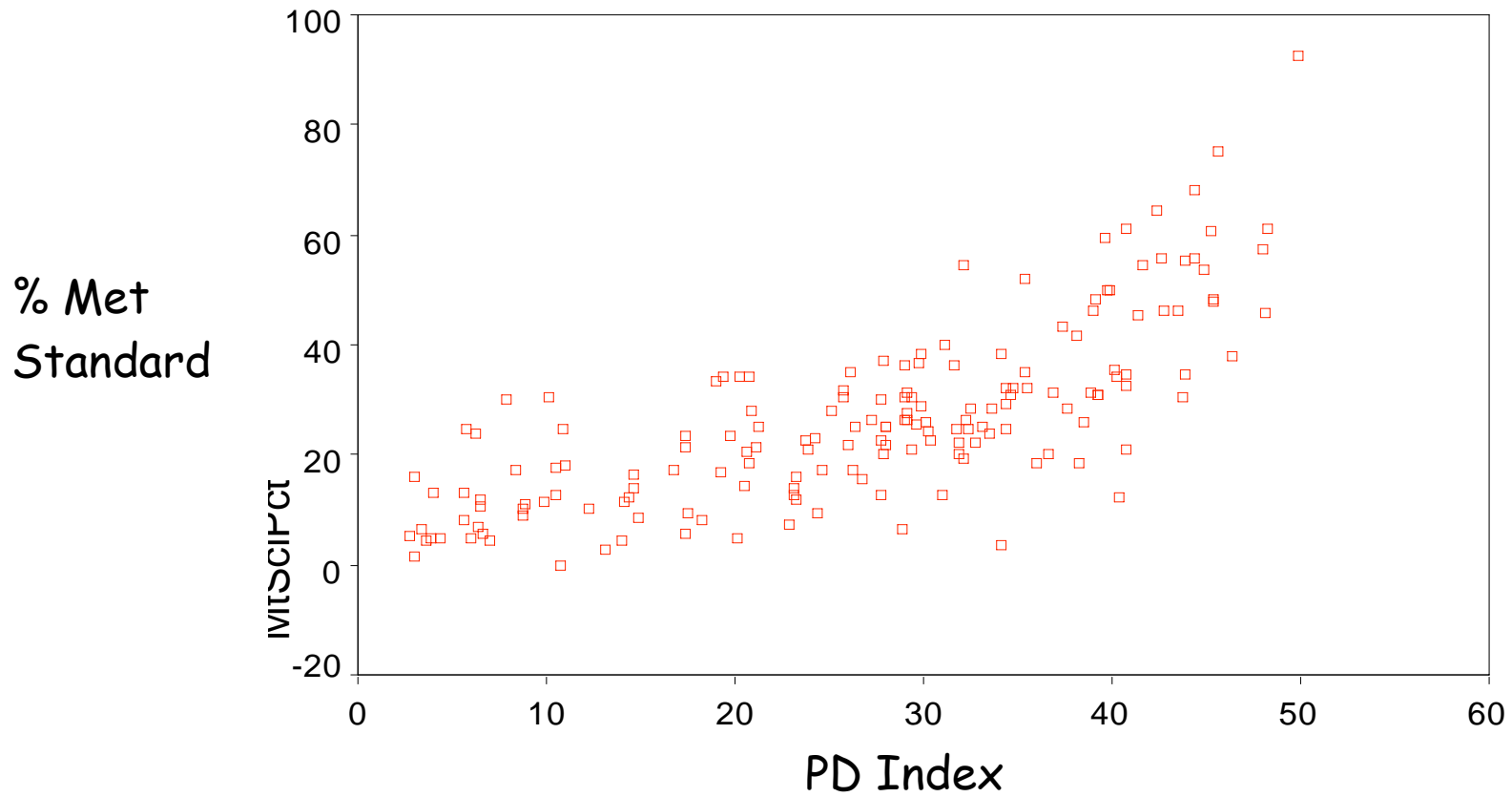
- School Level Grade 5 Science WASL data for 2004
- School demographic data 2001-2004
- LASER Professional Development Database
- Demographic data: poverty (free and reduced lunch); ethnic; gender; special needs
- Reform Rubrics
- Schools were identified on whether they were “high implementers or low implementers”
- We track every teacher for every hour of PD and the PD is not the same in every Alliance: this is data from the whole state.

## Analyzed Data from 166 Schools for:

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- Significant relationships between the:
  - Percent of students who met the Grade 5 science standard (WASL) and
  - The amount of LASER professional development that the teachers in the school received
- Statistically controlled for:
  - Student demographics
  - Socio-economic differences (FRL)

# After Corrections



## What We Found

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- There is a significant positive relationship between LASER professional development and the percentage of Grade 5 students who met the science standard

# *The HRI Assessment Study*

**Grade 6 Student Achievement  
Data and School  
Implementation Ratings**

# What We Did . . .

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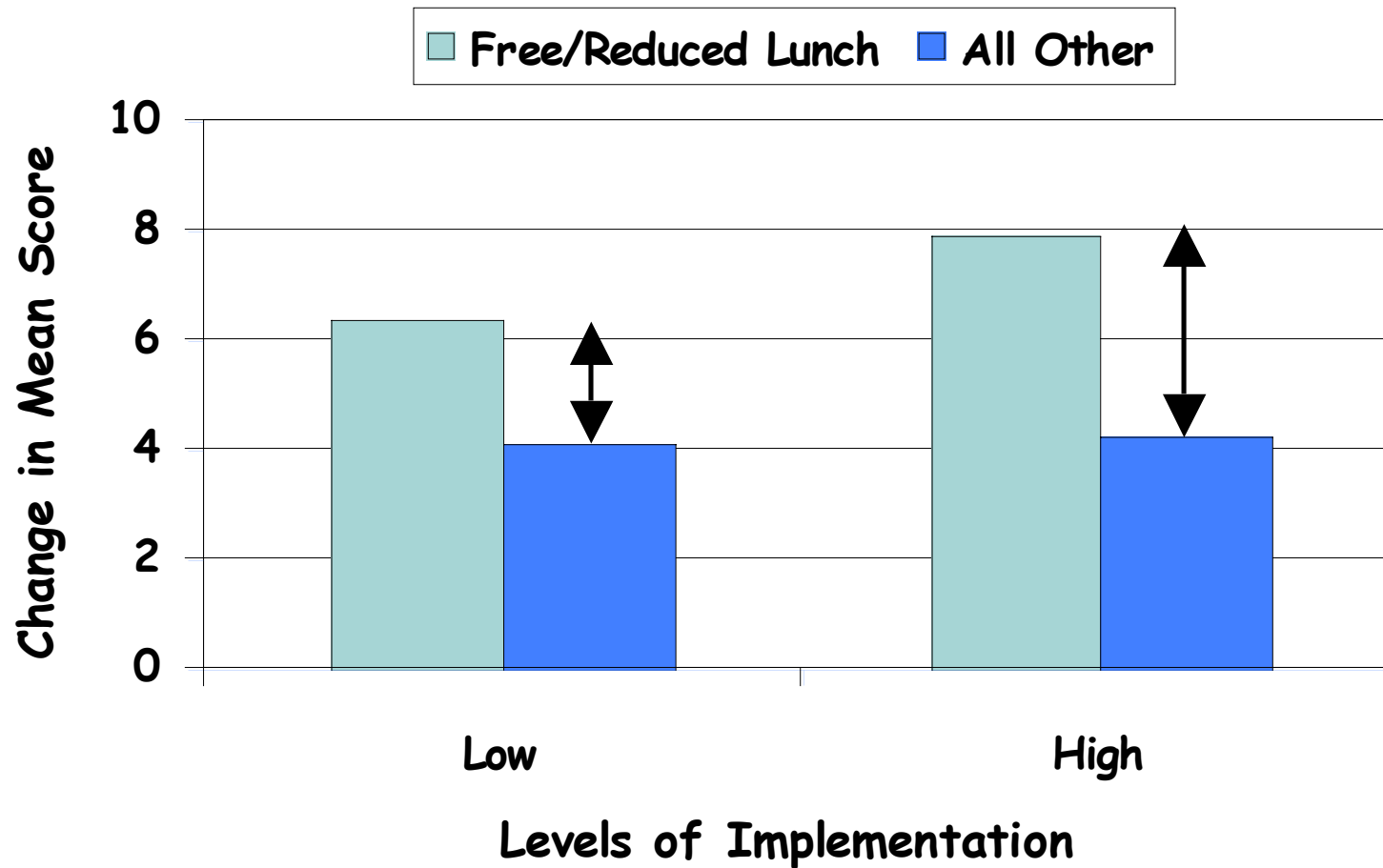
- Pre- and post-assessment results from 42 Grade 6 classes (1000+ students) using the HRI assessment
- 2004 LASER Science Reform Rubrics data about the levels of implementation of the schools

# What We Found . . .

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- High LASER implementing schools are doing better than low implementing schools at meeting the needs of students who qualify for free/reduced lunch

# Achievement Gains



*West Valley School  
District (Yakima) Study*

**Peter Finch, Assistant  
Superintendent and  
RMC Research**

## What Happened in West Valley . . .

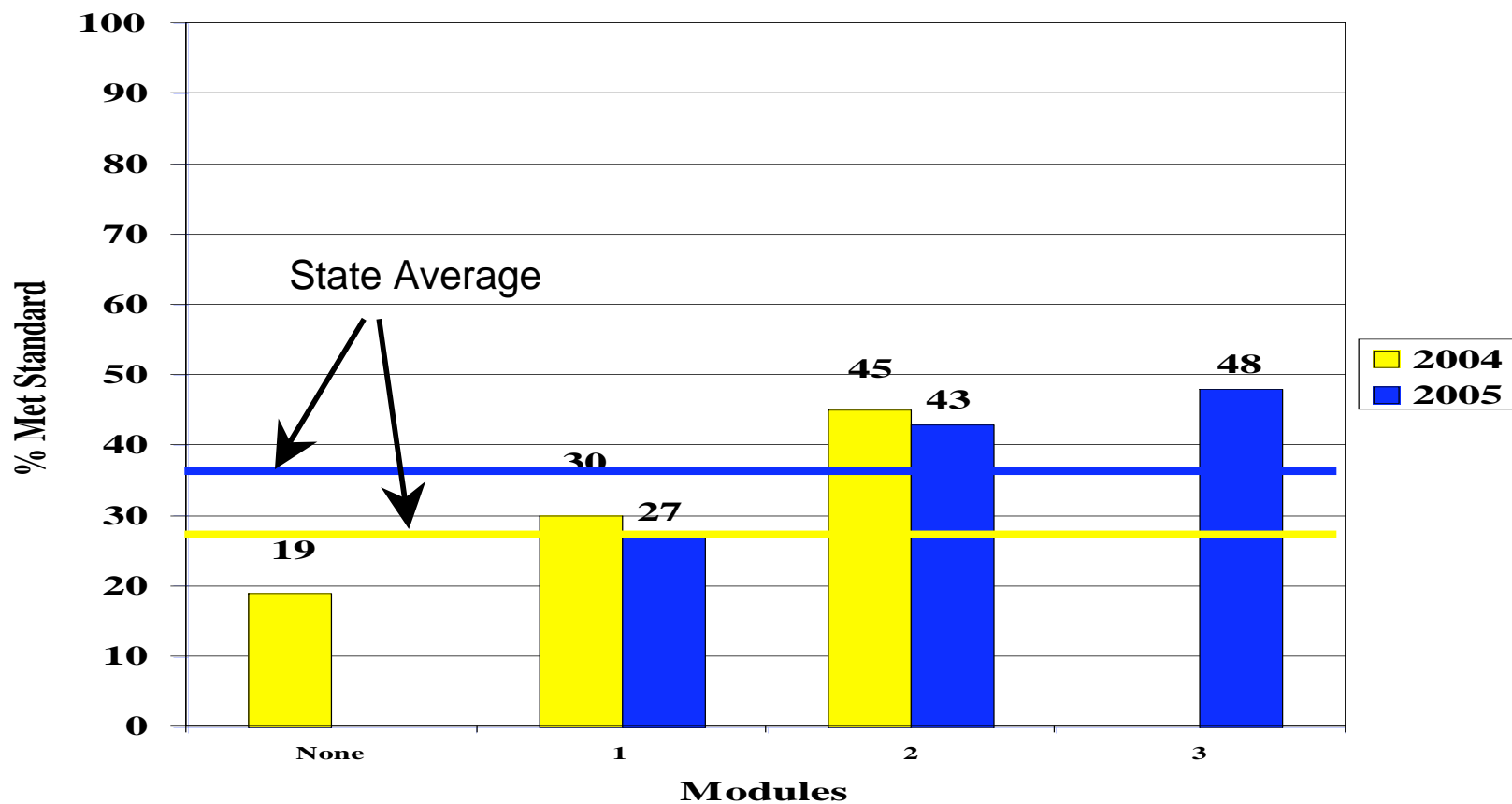
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- Pilot test involving phased implementation of inquiry-based instructional materials
- Dr. Finch noticed an important relationship between the number of modules students experienced and Grade 5 science WASL Scores
- Further data analysis by RMC Research to control for demographic and socio-economic factors

# Science WASL – WVSD Grade 5

## % students meeting standard

### Students receiving LASER Science instruction



## What We Found . . .

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- The number of science modules that students experience has a significant positive impact on their science WASL achievement above and beyond what can be explained by demographic factors (FRL, Special Education, & %White)

# *2006 Implementation Study*

Washington State LASER,  
OSPI, and RMC Research

## Data Sources

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- Online Teacher and Principal Survey
- Student-level Grade 5 Science WASL for 2005
- LASER Professional Development Database
- 2004-05 school demographic data
  - For Selecting Matching Schools

# Data Preparation

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- Matched online survey with student WASL data
  - 1400 students in 54 classes in 36 schools
- Matched professional development data with student WASL data
  - July 1, 2002 and March 31, 2005
  - 15,781 students, in 721 classes, in 288 schools in 61 districts

## Finding 1 – Number of Modules

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- **The more modules students experienced the better they did on the science WASL**

## Finding 2 – Importance of Fidelity

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- Students did better on the science WASL when their teachers use the materials the way they were intended to be used

## Finding 3 – Importance of PD

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- Students in classes of teachers with no training on inquiry-based science are less likely to perform as well on the science WASL as students in classes of teachers who have received any training
- Lack of adequate training impedes student performance

## Finding 4 – Impact on Standards

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- The number of modules students used is a significant positive predictor of their performance on the state test (WASL) including inquiry processes.

## Finding 5 – Impact by Item Type

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- The number of modules, fidelity of implementation, and whether the teacher has received training are all significant predictors of student performance on the open-ended items on the Grade 5 science WASL
- None of those variables were found to be predictors of student performance on the multiple choice items

## Finding 6 – Impact of PD

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- The more professional development the teacher has had on inquiry-based science the better his or her students did on the Grade 5 science WASL

## Finding 7 – Closing the Achievement Gap

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- When analyzing class-level results, racial and ethnic differences were not a significant factor in the analysis model
- Supports the notion that:
  - Inquiry-based science is effective with diverse populations
  - Enables schools that serve high proportion of minorities and economically disadvantaged students to catch up

## Looking Back . . .

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- The more modules that students experience that are taught by teachers who followed the teachers guide, and are trained in inquiry-based science, the better they will do on the science WASL
- Inquiry-based science may be an equalizer

# *Study of Highly Successful Schools*

Washington State LASER,  
OSPI, and RMC Research

## *Purpose of the Study*

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- To identify schools that have demonstrated consistent increases in the percentage of students who met the science standard on the Washington State Assessment of Student Learning (WASL).
- Interview the staff of those schools to determine to what they attribute their success.

# Criteria for Selecting of Schools

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- Focus on Grade 5
  - Very few schools could demonstrate consistent improvement at Grade 8 and 10.
- At least 10 Grade 5 students complete the science WASL in 2004, 2005, and 2006.
- An increase of at least 6% or more students meeting the standard each year.
- An increase of at least 17.5% or more students meet the science standard across the 2 time intervals.
- Started with at least 20% of the students meeting the science standard in 2004.

# Description of Selected Schools

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- 40 schools selected for interview
- 18 (45%) were in districts served by a LASER Alliance.
- 31 (78%) were in districts that participated in at least 1 LASER Summer Institute
- 10 (25%) are in districts that participate in one of the state MSP projects
- 4 (10%) are participating in the NCOSP
- 1 school did not participate in the interviews

# Interviews

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- During December 2006 and January 2007.
- Conducted By:
  - RMC Research staff
  - Graduate students from the science education department of Portland State University
- Using structure interview protocol
  - Developed with input from LASER project leadership
  - Training provided
- With person most knowledgeable about success
  - Initial contact with Principal and sometimes other school staff

# Two Tiered Approach

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- Open ended initial question
  - Summarized increases in WASL scores.
  - What is your school doing to improve science teaching and learning? To what do you attribute this success?
- Followed by questions about the contribution of specific aspects such as
  - Professional development
  - Instructional materials
  - Assessments
  - LASER services

## Finding 1 – WASL Preparation

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- Initially, 54% (21) of the schools indicated that they engage students in some form of preparation for the WASL.
- Upon questioning, 95% (37) indicated that they engage students in some form of preparation for the WASL.

## Finding 2 – Instructional Materials

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- All schools used inquiry-based instructional materials – Mostly FOSS and STC
- 49% (19) of the schools indicated that recent changes to the science instructional materials attributed to their success
- Some customized or locally developed kits
- Heavily supplemented
- Non-LASER Alliance schools use a wider variety of supplementary materials and approaches.

## Finding 3 – Science Advocate

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- 77% (30) of schools interviewed identified 1 or 2 people who were advocates for science education.
- Passionate about science – Made things happen
- Roles included:
  - Science specialist (16)
  - Teacher leaders (9)
  - Strong teacher or team (6)
  - Community member (3)
  - Administrator (2)

## Finding 4 – PD

- 82% (32) of the schools indicated that professional development contributed to improving student WASL scores
- PD in Non-LASER Alliance schools dominated by only kit and WASL training
- PD in LASER Alliance schools is more varied
  - Science Notebooks
  - Leadership
  - Science Content
  - Inquiry
  - Coaching, Mentoring, & Consultant
  - EALRs and GLEs Workshops
  - More Organized School-Based PD

## Finding 5 – EALRs & GLE

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- 51% (20) of the schools attributed the success of their students to increased emphasis on and alignment of curriculum to the Standards.

## Finding 6 – Instructional Time

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- 38% (15) of the schools attributed their success at least partially to increased science instructional time

*Questions ? ? ?*