

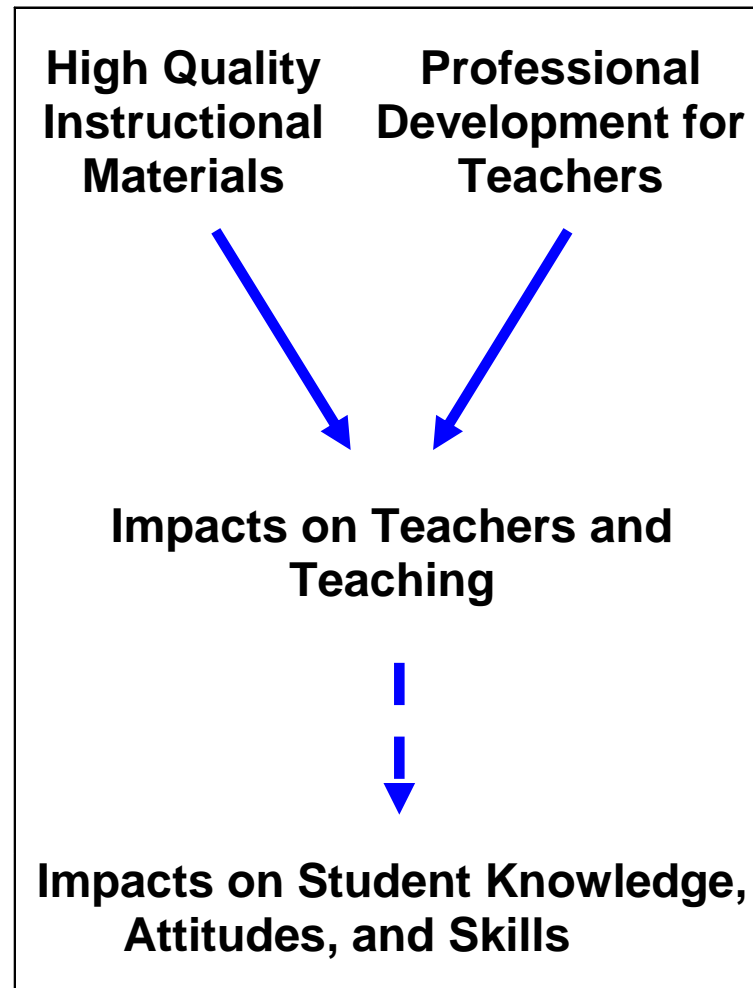


Findings from the LSC

May 5, 2005

horizon
RESEARCH, INC.

LSC Logic Model



Key elements of the LSC

- Targeted all teachers in a jurisdiction for professional development (minimum 130 hours).
- Emphasized preparing teachers to implement project-designated mathematics/science instructional materials in their classes.
- Promoted efforts to build a supportive environment for improving science, mathematics, and technology instruction.

LSC Core Evaluation

- NSF wanted to look across projects at the program as a whole.
- Decided to have projects collect a common “core” of data for cross-project evaluation.

Elements of the Core Evaluation

Teacher-Level

- Questionnaires
- Classroom Observations
- Interviews

School-Level

- Principal Questionnaires

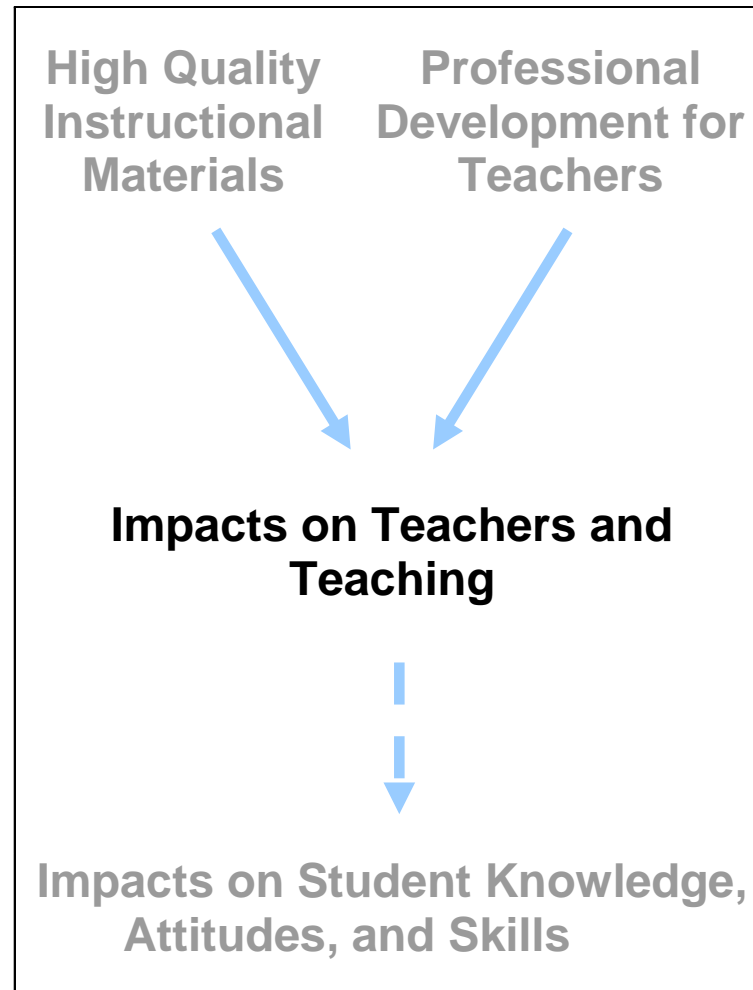
Project-Level

- Professional Development Observations
- Project Team Interviews
- District Policy Forms
- Report (Includes Program Ratings)

LSC Core Evaluation

- Projects selected evaluators.
- Once approved by NSF, HRI provided training in PD and classroom observing.
- HRI printed and analyzed questionnaires; provided data tables to each project.

LSC Logic Model

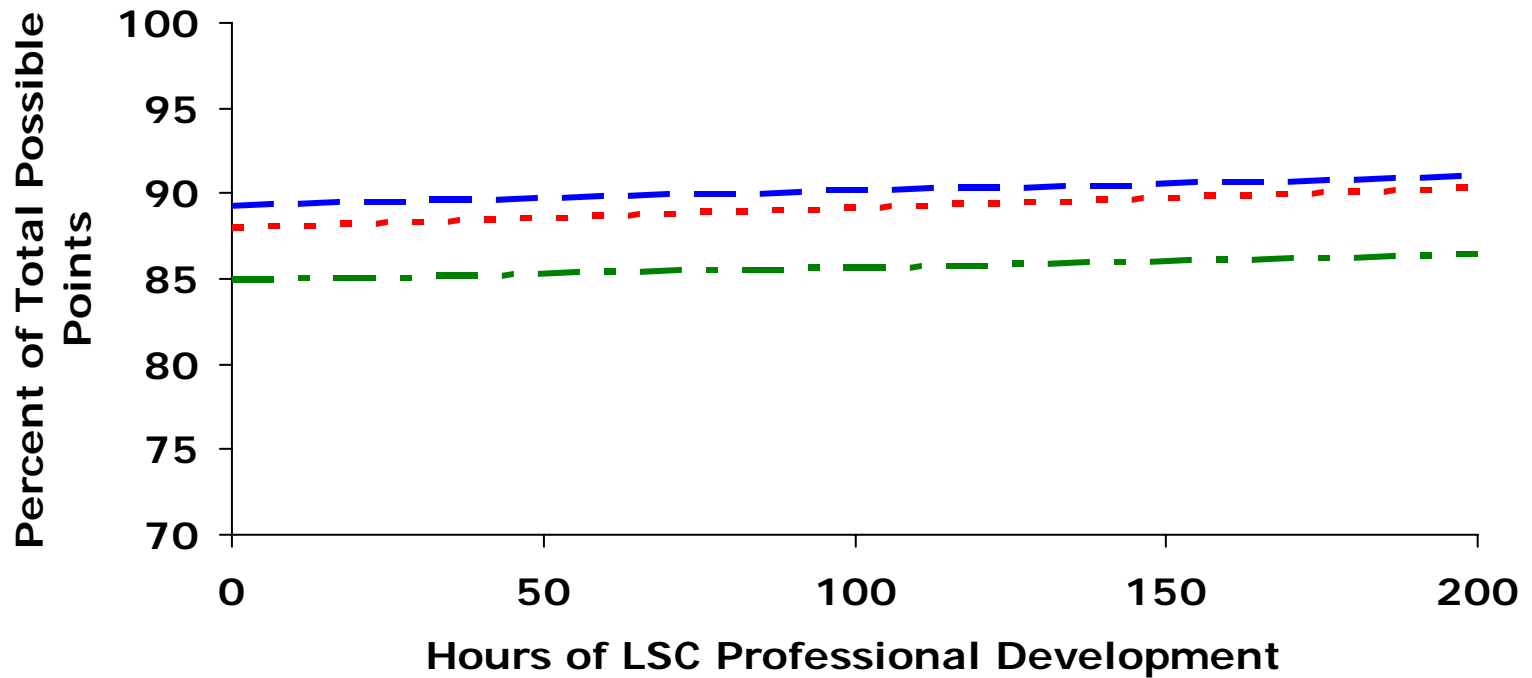


Impact of LSC on Teachers

LSC professional development had a positive impact on:

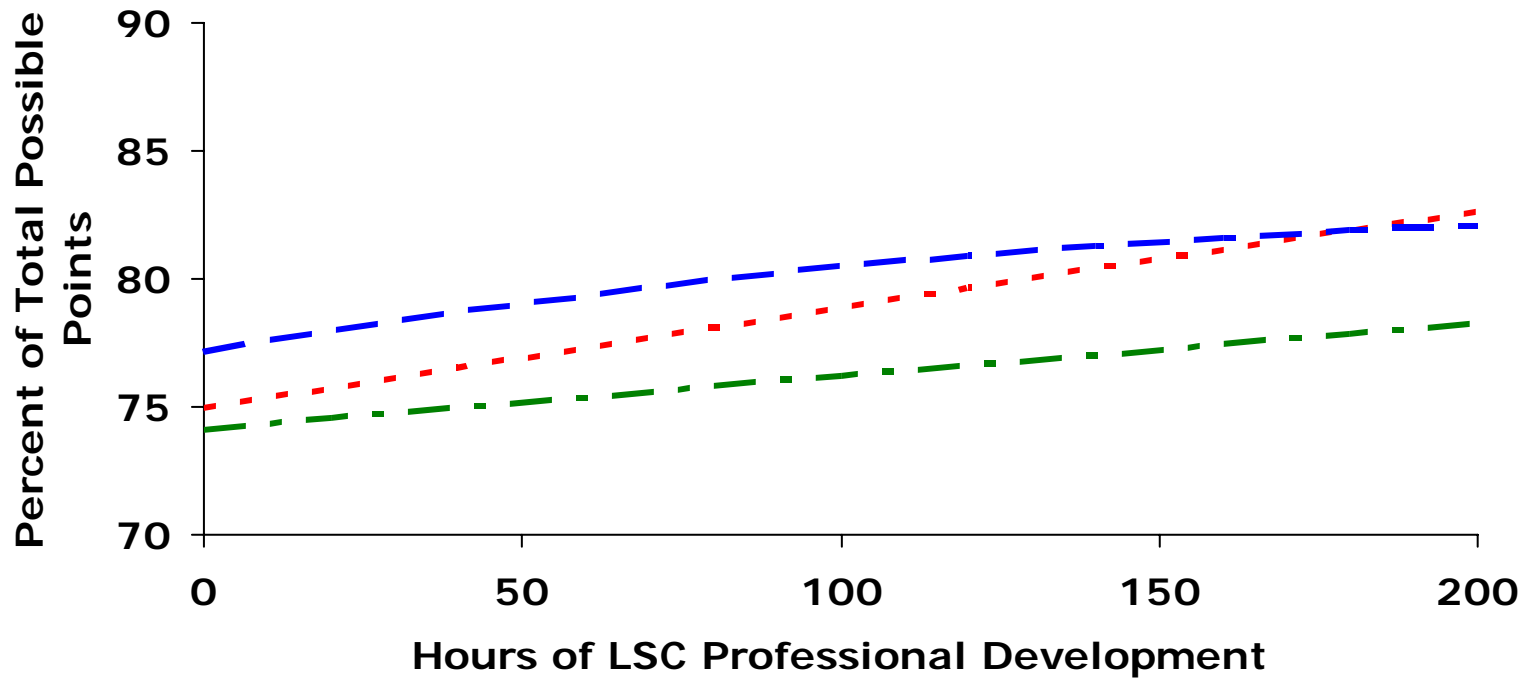
- Teachers' attitudes toward reform-oriented teaching in mathematics and science
- Teachers' perceptions of their pedagogical preparedness
- Teachers' perceptions of their content preparedness

Teacher Attitudes Toward Teaching



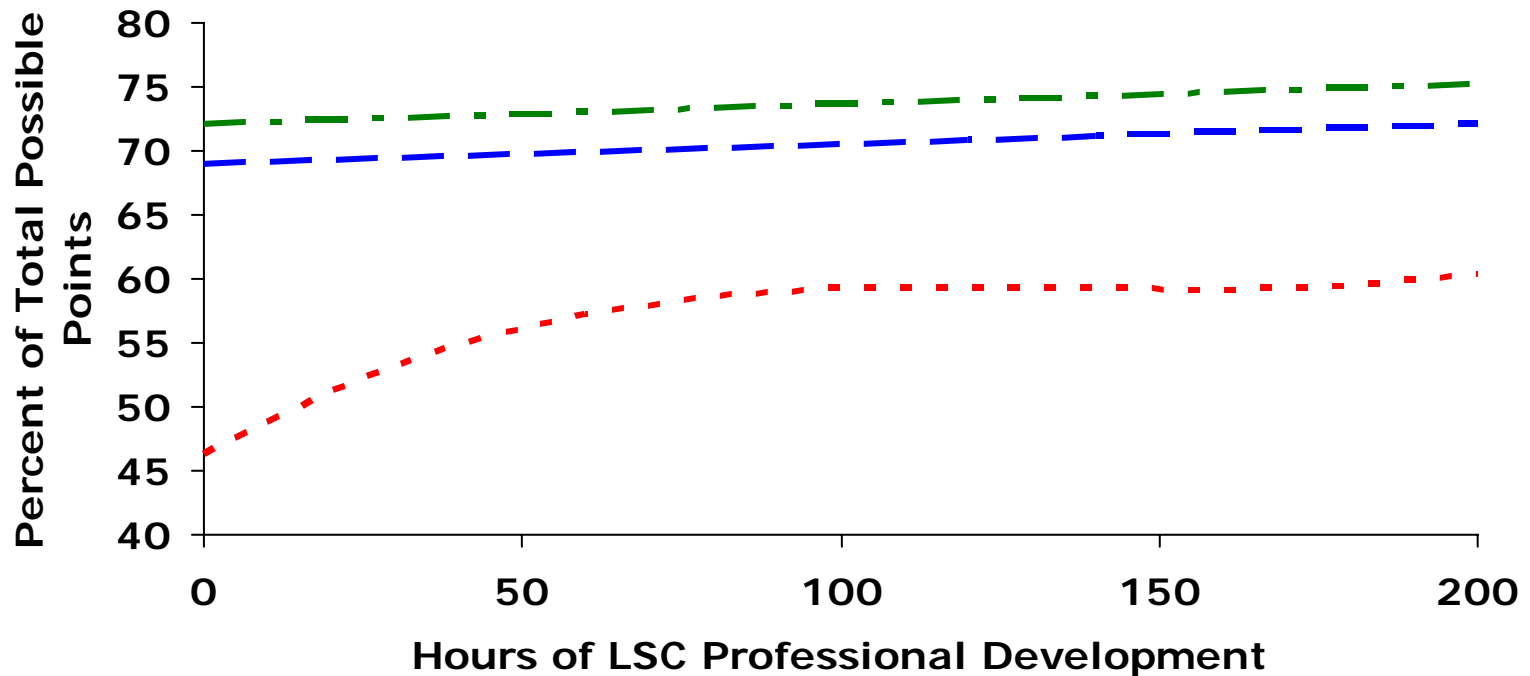
--- K-8 Science --- K-8 Mathematics --- 6-12 Mathematics

Teacher Perceptions of Their Pedagogical Preparedness



--- K-8 Science --- K-8 Mathematics --- 6-12 Mathematics

Teacher Perceptions of Their Content Preparedness



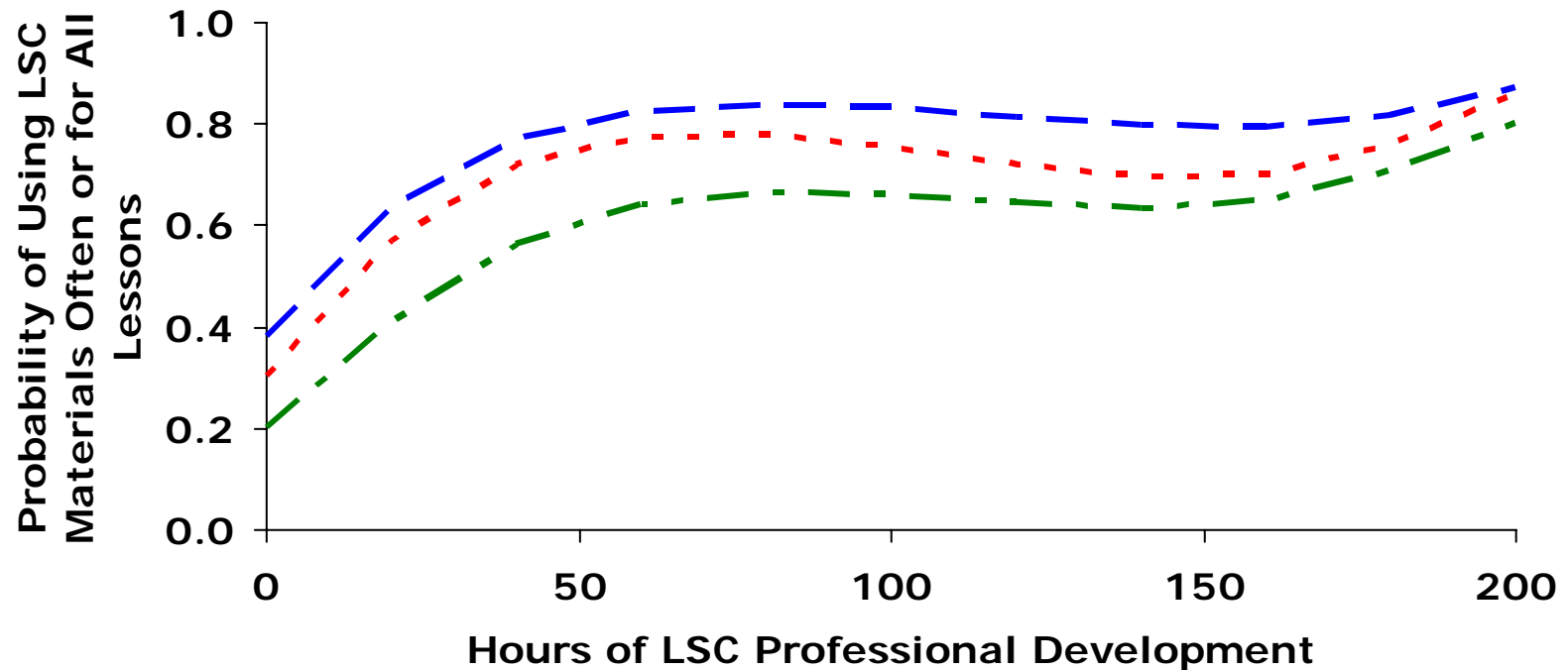
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Impact of LSC on Teaching

LSC professional development had an impact on:

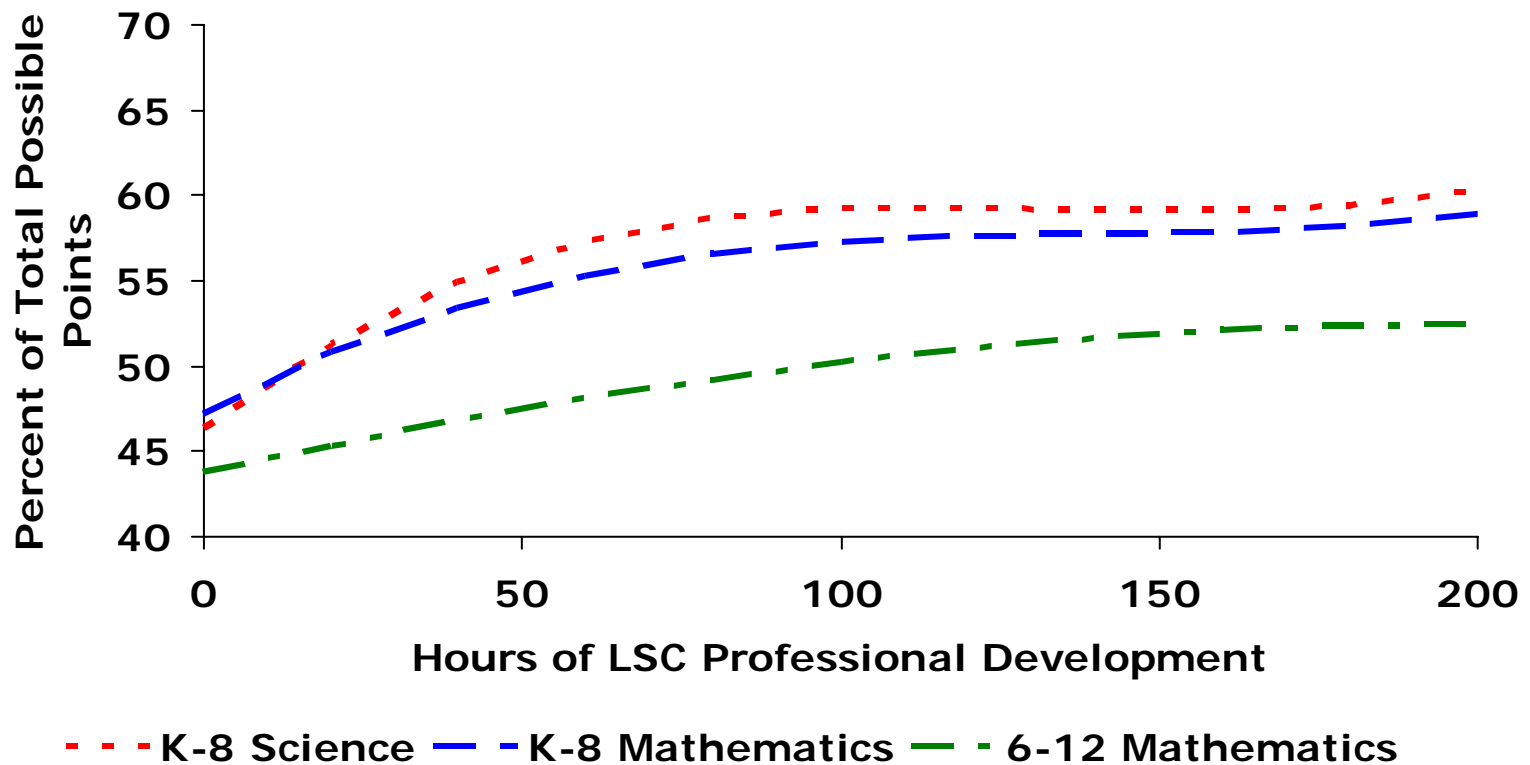
- Use of designated instructional materials
- Use of investigative practices
- Classroom culture
- Overall quality of mathematics /science lessons
- Increased time spent on science instruction in the elementary grades

Frequency of Use of Designated Instructional Materials

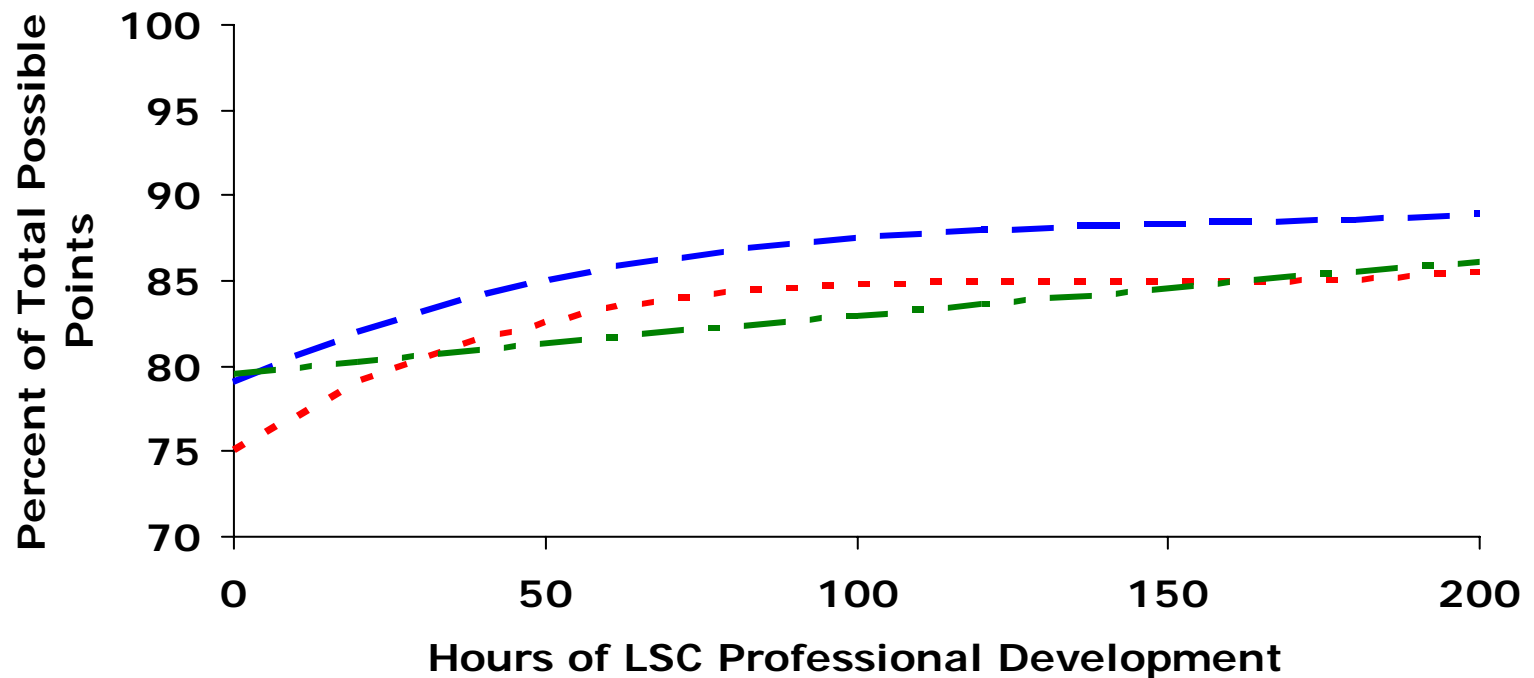


--- K-8 Science --- K-8 Mathematics --- 6-12 Mathematics

Teacher Use of Investigative Practices

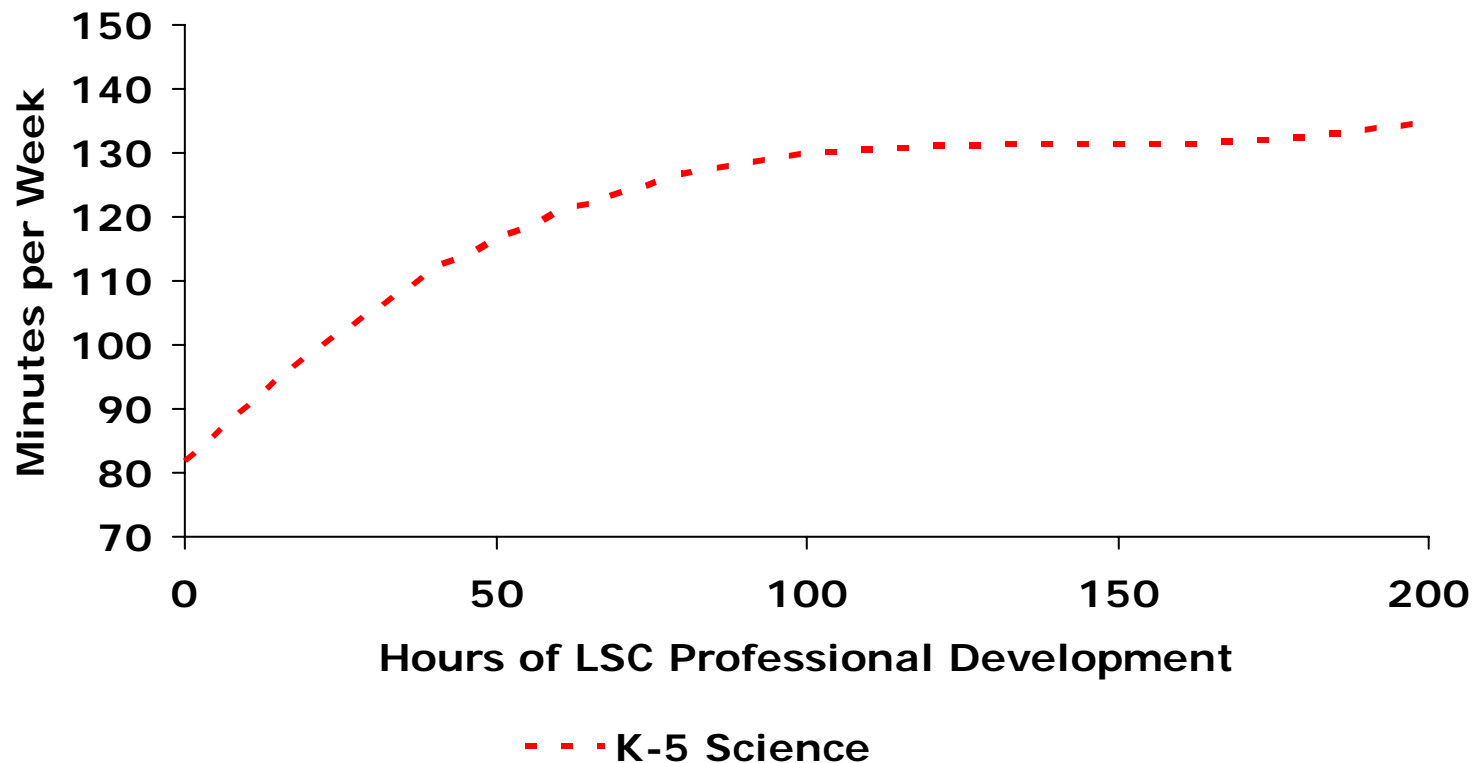


Investigative Classroom Culture

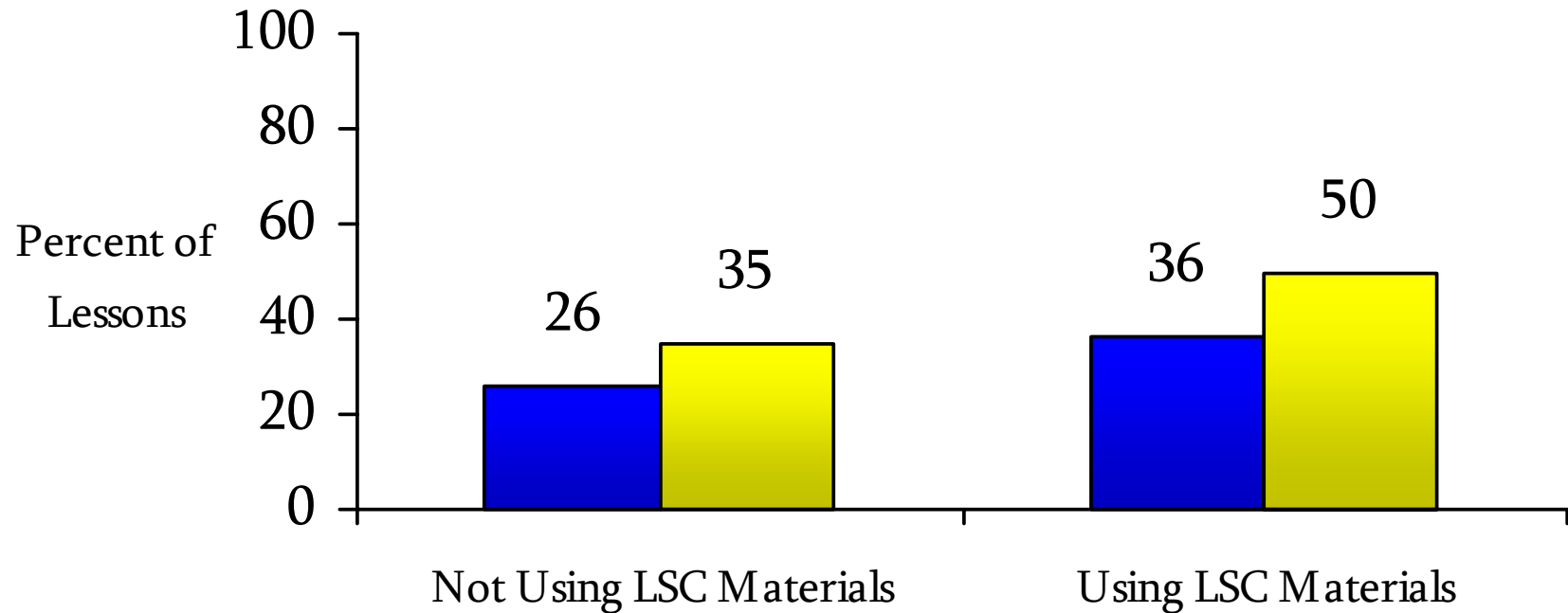


--- K-8 Science --- K-8 Mathematics --- 6-12 Mathematics

Time Devoted to Science (K-5 self-contained classes)



Highly Rated Lessons



- 0-19 Hours of LSC Professional Development
- 20 or More Hours of LSC Professional Development



Participation in LSC professional development was related to higher quality instruction on many key indicators.

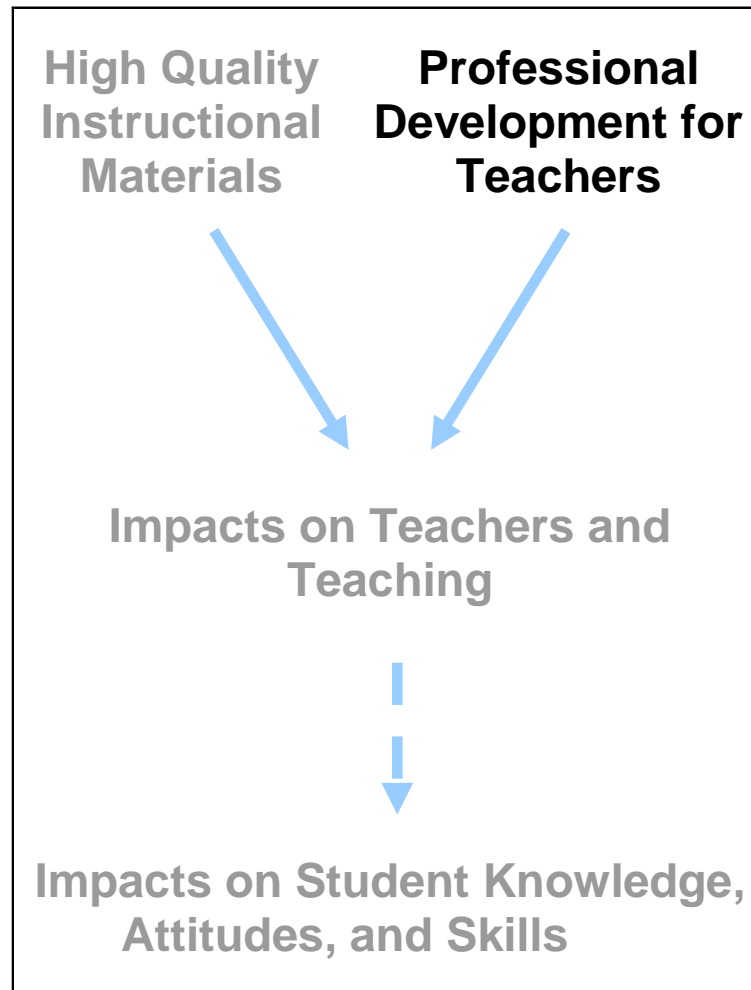
Relative Strengths of Lessons

- Climate of respect for students' experiences, ideas, and contributions
- Active participation of all was encouraged and valued
- Teacher displayed an understanding of concepts
- Important and worthwhile content
- Lesson encouraged a collaborative approach to learning
- Incorporated tasks, roles, and interactions consistent with the spirit of investigation

Areas Most in Need of Further Improvement

- Intellectual engagement with important ideas
- Intellectual rigor, constructive criticism, and challenging of ideas
- Effective questioning strategies
- Adequate time and structure provided for “sense-making”/wrap-up

LSC Logic Model



Factors Influencing Session Quality

When trying to deepen teachers' content knowledge or prepare teachers to implement LSC-designated materials in the classroom, sessions using LSC-designated instructional materials were more likely to be rated effective.

Professional Development Providers and Session Quality

For most professional development purposes, type of provider was not a significant predictor of session quality; however, sessions led by mathematics/science education faculty were rated more highly for sessions that focused on:

- Creating a vision of effective instruction
- Promoting reflective practice
- Understanding student thinking

Relative Strengths of LSC Professional Development

- Climate of respect for participants' experiences, ideas, and contributions
- Active participation of all was encouraged and valued
- Facilitators displayed an understanding of concepts

Relative Strengths of LSC Professional Development


- Content appropriate for purposes of session and participants' background
- Encouraged a collaborative approach to learning
- Provided opportunities for teachers to consider classroom applications of resources, strategies, and techniques
- Incorporated tasks, roles, and interactions consistent with the spirit of investigation

Relative Weaknesses of LSC Professional Development

- Lack of intellectual engagement with important ideas relevant to classroom practice
- Did not “frame” the activity to help participants understand the session purpose
- Lack of intellectual rigor, constructive criticism, and challenging of ideas
- Little attention to student thinking/learning

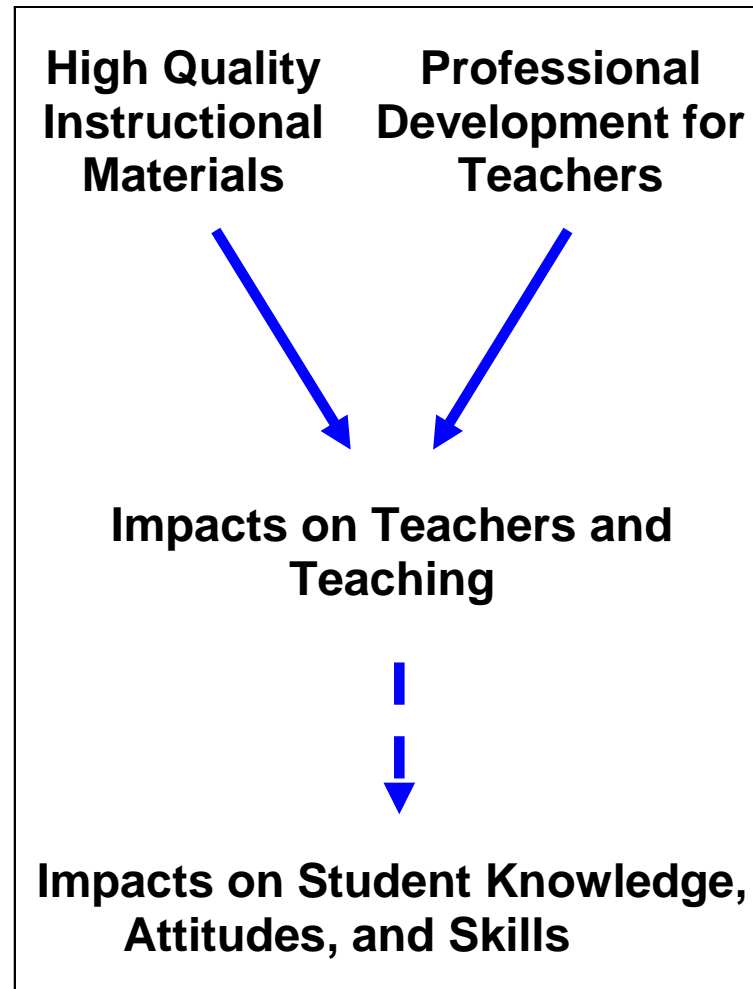
Relative Weaknesses of LSC Professional Development

- Inadequate time and structure provided for 'sense-making' about content and classroom practice
- Facilitators did not effectively model questioning strategies
- Lack of adequate time and structure for wrap-up



Note the similarities in strengths and weaknesses of professional development and classroom instruction

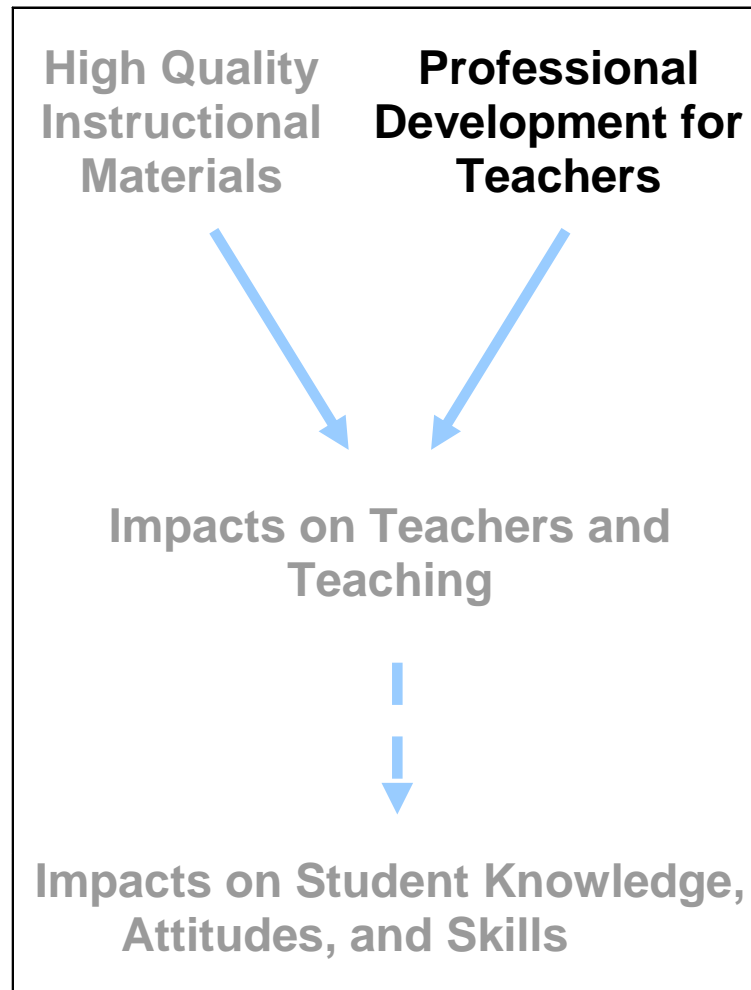
PD Logic Model



Evaluation Tools

- What's available now
- What will be available in the near future
- Strengths and weaknesses of the instruments

PD Logic Model



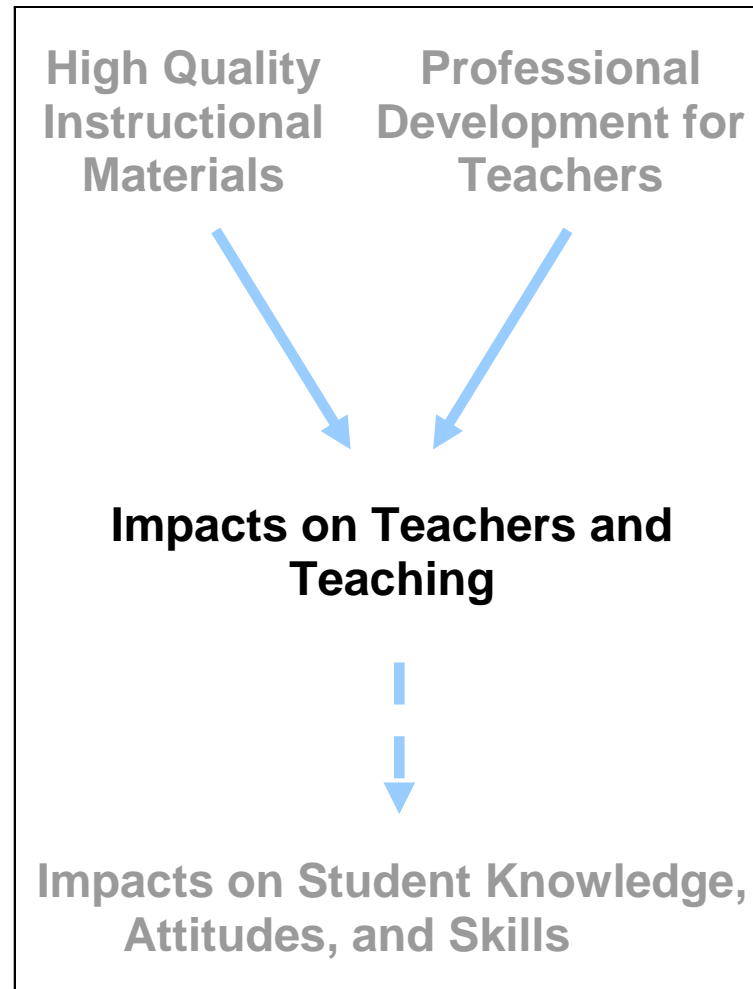
LSC Professional Development Observation Protocol (PDOP)

- Evaluator rates PD session on a number of indicators related to its:
 - Design;
 - Implementation;
 - Content (content and/or pedagogical); and
 - Culture.
- Evaluator provides overall quality of PD session rating.

LSC Professional Development Observation Protocol (PDOP)

- Project staff and evaluators needs a common vision of instruction and professional development
- Overall rating is a holistic rating across purposes; we would like a more fine-grained measure of quality.

PD Logic Model



LSC Teacher Questionnaire

- Has scales for:
 - Teacher Attitudes Toward Teaching;
 - Perceptions of Pedagogical Preparedness;
 - Perceptions of Content Preparedness;
 - Classroom Culture;
 - Use of Traditional Teaching Practices; and
 - Use of Investigative Teaching Practices.

LSC Teacher Questionnaire

- Strengths:
 - Relatively easy and inexpensive to administer to large numbers of teachers.
 - Reasonably valid and reliable measures of classroom practice.
- Weaknesses:
 - Validity of preparedness measures not established.
 - Just because teachers are doing more of something doesn't mean they are doing it well.

Assessments of Content Knowledge for Teaching

- Science:
 - HRI's ATLAST project is developing teacher assessments in:
 - Force and motion;
 - Plate tectonics; and
 - Flow of matter and energy in a living system.
- Mathematics:
 - Hill and Ball assessments (elementary topics)
 - Ferrini-Mundy assessments (secondary algebra)

Assessments of Content Knowledge for Teaching

- Strengths:
 - Relatively objective measures of teacher content knowledge and application of content knowledge
 - Items embedded in the context of teaching; more like what teachers are expected to do.
- Weaknesses:
 - Only exist (or planned) for a small number of content areas/grade-ranges.

LSC Classroom Observation Protocol (COP)

- Evaluator rates lesson:
 - Design;
 - Implementation;
 - Content; and
 - Culture.
- Evaluator provides overall lesson quality rating.

LSC Classroom Observation Protocol (COP)

- Strengths:
 - Provides insight into the quality of instruction.
 - Provides “face validity” to evaluation.
 - Having an observation protocol helps ensure that all observers are attending to the same things.
 - Protocol isn’t content-specific.

LSC Classroom Observation Protocol (COP)

- Weaknesses:
 - Observers need both knowledge of the content and an understanding of teaching; observers could get fooled by the form of the lesson instead of focusing on its substance.
 - Need to train observers to obtain interrater reliability.
 - Much more costly than surveys.
 - Observation of a single lesson leaves many questions unanswered.
 - Protocol isn't content-specific.

Revisions to LSC Instruments in the Works

- Professional Development Observation Protocol
- Teacher Questionnaire
- Classroom Observation Protocol

Professional Development Observation Protocol

- For sessions with multiple purposes (e.g., deepening teacher content knowledge and exploring instructional materials), rate quality for each purpose.
- Instead of Design, Implementation, Content, and Culture, rate extent to which:
 - Presentations/activities in the session were appropriate (accessible yet challenging) for the participants;
 - Participants were intellectually engaged with important ideas relevant to the intended content;
 - Session provided opportunities for sense-making of the intended content;
 - Learning environment promoted an open exchange of ideas;
 - Learning environment encouraged rigor; and
 - There were opportunities to reflect on/consider applications to practice.

Teacher Questionnaire

- Develop new Attitudes Toward Teaching scale.
- If helpful, post scales (mini-questionnaires) on HRI website for general use.

Classroom Observation Protocol

- Rather than rate Design, Implementation, Content, and Culture, rate the extent to which the:
 - Content of the lesson was appropriate and aligned with learning goals;
 - Presentations/activities in the lesson were appropriate (accessible yet challenging) for the students;
 - Students were intellectually engaged with important ideas relevant to the intended content;
 - Lesson provided opportunities for sense-making of the intended content;
 - Learning environment promoted an open exchange of ideas;
 - Learning environment encouraged rigor; and
 - Overall quality of lesson.

Classroom Observation Protocol

- Though not content specific, encourage observers to focus on the science/mathematics content of the lesson.
 - Instructional activities aligned with the learning goal, taking into account research on student thinking in that content area.
 - Students intellectually engaged with the relevant ideas.
 - Sense-making around relevant ideas.

Availability of Instruments

- Now:
 - LSC professional development protocol, classroom observation protocol, and teacher questionnaires.
 - Hill & Ball teacher content scales (in certain areas); requires attending training session.

Availability of Instruments

- In the works:
 - ATLAST middle grades science teacher assessments, available summer 2006.
 - Revised LSC instruments: order of instrument revision under consideration.
 - Additional Hill and Ball elementary grades mathematics teacher assessments.
 - Ferrini-Mundy middle grades mathematics teacher assessments.