Panel 1. State of the Science in the U.S. and Brazil

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From Topical Research to Evidence-based Practices

- The achievement gap is real, and is exacerbated by a gap in access to research-based strategies and practices across topical areas.

- Closing the achievement gap depends on the use of effective, research-based strategies and practices.
- Strategies must intentional and appropriate.

A Few Caveats…

- Each *child, family and teacher is unique*…
  - Strategies must be developmentally, linguistically, and culturally appropriate for the population served
- Each *center, classroom and home is unique*…
  - Careful translation of strategies allow them to "fit" within the culture and climate of the setting
- Each *strategy is specific*…
  - Evidence is based on implementing the strategy "as designed"

Topical Areas

- Early Learning
- Ecology of Development
- Program Quality
- Professional Development

UNL BRAZIL

PARTNERS WORKING MEETING

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Teachers' Science Talk and Preschoolers' Engagement and Learning

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Early Science Learning

- Young children are innately curious about the world, and science activities generally engage children's interest.
- It is important to broaden children's procedural and thinking skills for investigating the world, solving problems, and making decisions; and to increase their knowledge of the natural world.
- Science activities encourage young children to actively participate in their learning.

Early Science Learning

- Early childhood teachers reported a lack of confidence in teaching science-related curricula.
- Effective strategies for teaching young children science have not been identified.

Developmentally Appropriate Practice

- Balance between child-initiated and teacher-guided opportunities for learning
- Combination of responsive teaching and explicit instruction

Intervention: Content

- Objects' floating and sinking (science)
  - Understand the concepts of size and weight and their relation to floating and sinking by measuring and comparing objects with different properties
  - Make correct judgments about whether an object would float or sink by using scientific problem-solving strategies
  - Learn to make an object that floats sink and to make an object that sinks float

Intervention: Teaching Approaches

Responsive Teaching (RT)

4 sessions

- Observe and describe children's behavior
- Comment on and ask questions about what children did and said
- No explicit instruction

RT + Explicit Instruction (EI)

4 sessions

- (RT plus) 5- to 10-minute explicit instruction about concepts, vocabulary, and scientific problem-solving process

Young children in the combined intervention group (RI+EI) learned more science concepts and vocabulary and more content-specific scientific problem-solving skills than children in RT group (Hong & Diamond, 2012).

Children's Engagement

- "The amount of time a child spends interacting with the environment (i.e., teachers, peers, or materials) in a developmentally and contextually appropriate manner at different levels of competence" (McWilliam & Casey, 2008, p. 4).
  - Amount of engagement
  - Sophistication/complexity of engagement
- Improved engagement → more positive behavior, higher level thinking and reasoning skills, improved peer relationships, & improved learning

Research Questions

- What types of teacher talk did the teacher use to teach preschoolers science concepts, vocabulary, and scientific problem-solving skills?
- Are types of teacher talk associated with children's science learning? Does the level of children's engagement moderate the association between teacher talk and children's science learning?

Participants & Procedure

- 37 4- and 5-year-old preschoolers (26 European American; 20 girls) recruited from early childhood programs in a mid-sized Midwestern community
- Pre-test
  - Science concepts and vocabulary
  - Scientific problem-solving skills

Participants & Procedure (cont.)

- Attended 4 sessions of high quality small-group science activities (RT+EI)
  - Understanding the concepts of size and weight and their relation to floating and sinking
  - Making correct judgments about whether an object would float or sink by using scientific problem-solving strategies
  - Learning to make an object that floats sink and to make an object that sinks float
- Post-test
- Videotaped sessions were used to code teacher talk and children's engagement

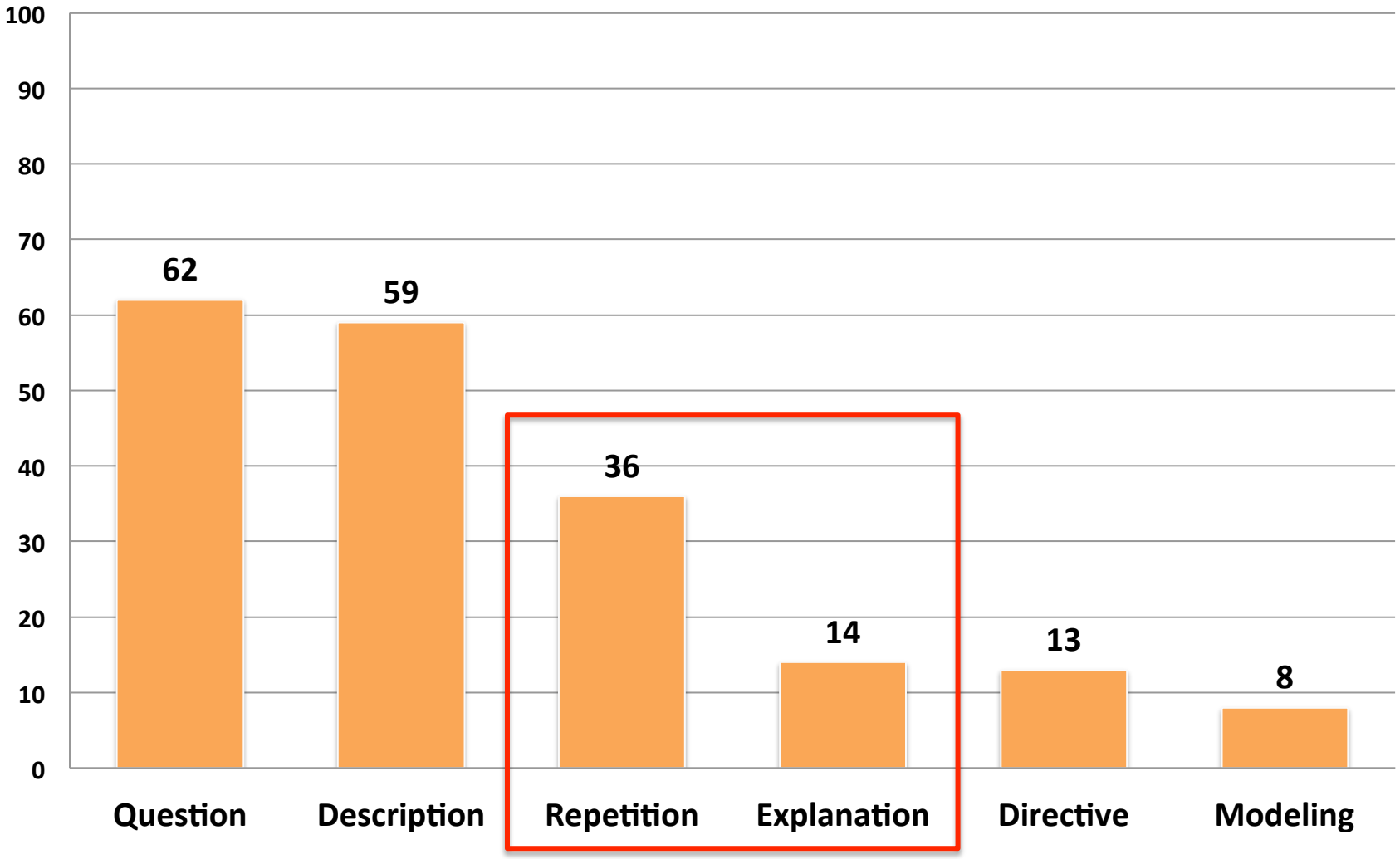
Measures

- Science concepts and vocabulary
- Scientific problem-solving skills
- Types of teacher talk
- Children's engagement
  - Duration of engagement (amount)
  - Sophistication of engagement (complexity)

Results

- What types of teacher talk did the teacher use to teach preschoolers science concepts, vocabulary, and skills?

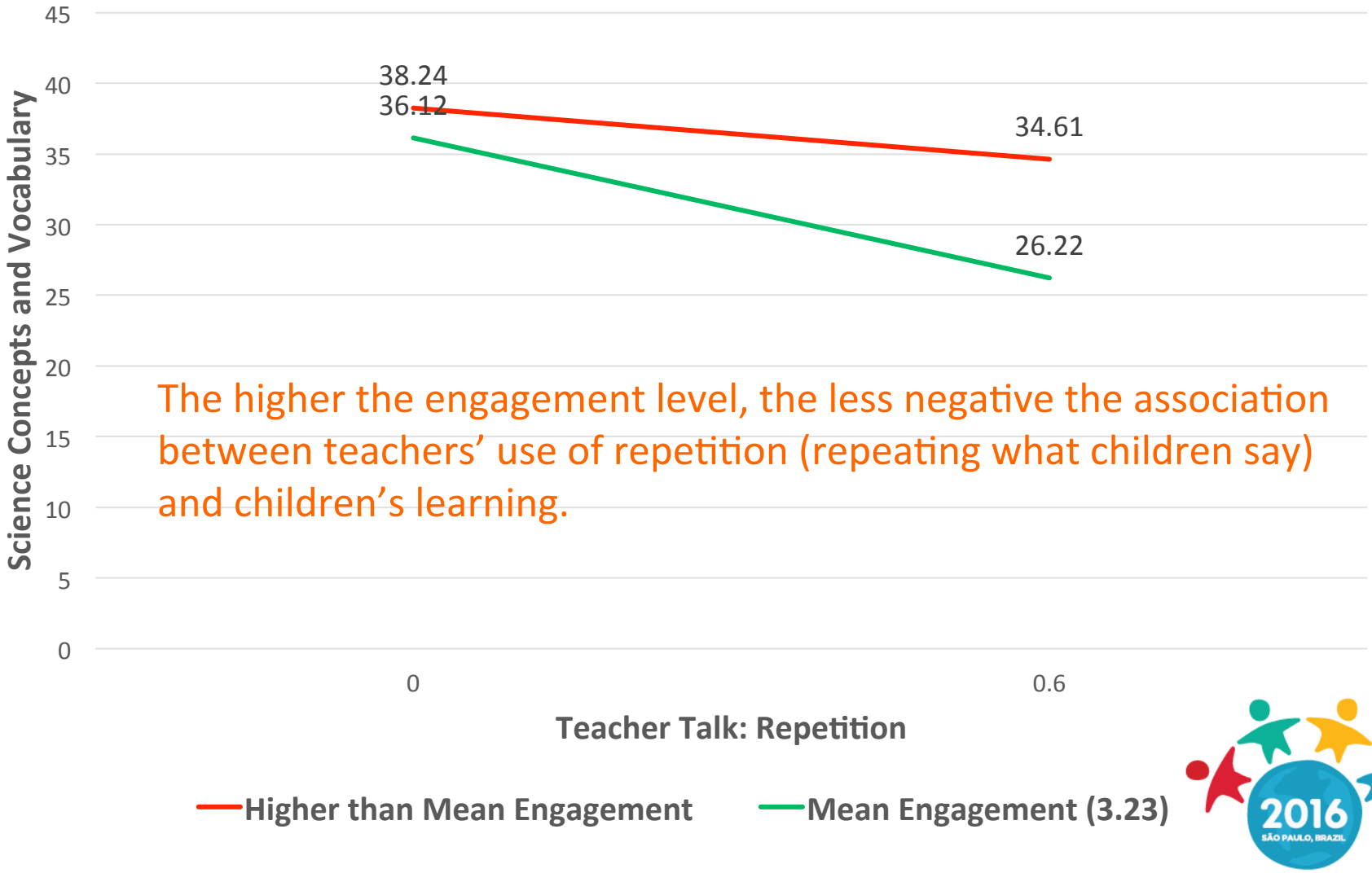
Results (cont.)



Results (cont.)

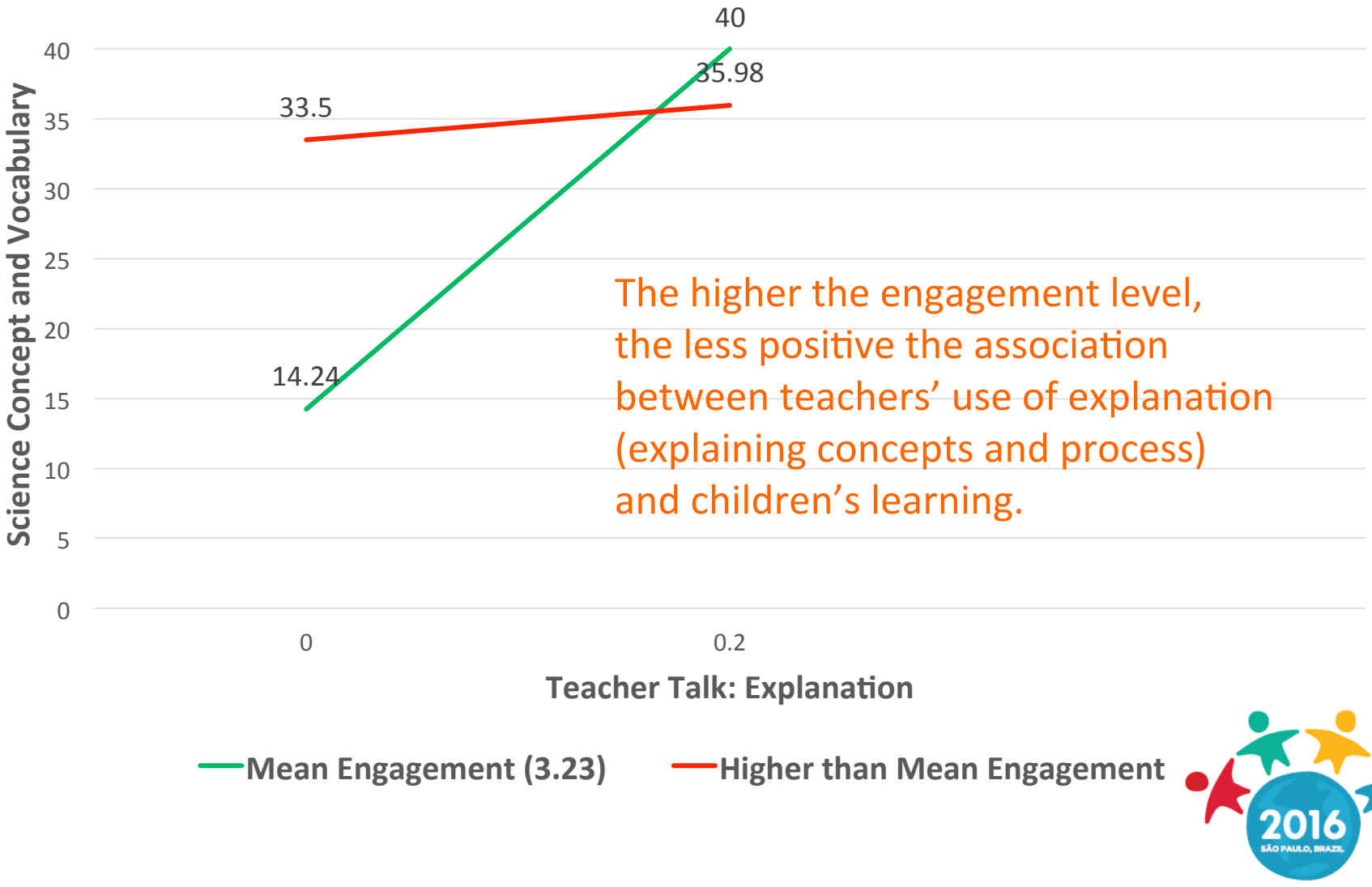
- Are types of teacher talk associated with children's science learning? Does the level of children's engagement moderate the association?
  - DV: Posttest score
  - IV: Teacher talk
  - Moderator: Children's engagement (complexity)
  - Covariates: Pretest score, Expressive vocabulary

Repetition X Engagement



The higher the engagement level, the less negative the association between teachers' use of repetition (repeating what children say) and children's learning.

Explanation X Engagement



The higher the engagement level, the less positive the association between teachers' use of explanation (explaining concepts and process) and children's learning.

Discussion & Next Steps

- The quality of children's engagement in science activities is important for their learning of science concepts and vocabulary, and vice versa.
- The quality of children's engagement in science activities should be considered when teachers choose types of their talk to support children's learning of science concepts and vocabulary.

Discussion & Next Steps

- Results may look different if science instruction and interactions are examined in a more naturalistic environment with more variability in main study variables and the science content covered.
- Teachers' use of differentiated instruction and scaffolding in science teaching seems important.
  - Initial level of understanding
  - Sophistication of engagement (complexity)

Thank You