

# Professional Development Needs for Data Literacy

**Angela DeBarger, Barbara Means, and Eva Chen**  
*SRI International*

AERA 2009 Symposium:  
*Will the Use of Data Lead to Informed  
Decision Making as Policy Makers Assume?*

# Overview

- **Prior research on data-informed decision making**
- **Development of data scenarios to assess teachers' data literacy skills**
- **Findings**
- **Next steps**

# Prior Research on Decision Making

- **Tversky and Kahneman (1982)**
  - Representativeness bias
  - Availability bias
  - Anchoring and adjustment
- **Educators are subject to the same biases—a natural response to information overload and lack of time.**
  - Focusing on data that conforms to what is expected (Birkeland et al., 2005; Spillane, 2000; West and Rhoton, 1994)
  - Oversimplifying data (Honig, 2003; Spillane, 2000)

# An Investigation of Teachers' Data Literacy Skills

- **Identified components of data literacy**
  - Question Posing
  - Data Location
  - Data Comprehension
  - Data Interpretation
  - Data Use
- **Developed data scenarios to elicit teachers' data-informed decision making skills**
  - Reviewed by assessment and mathematics education experts
  - Pilot-tested with teachers
  - 3 forms each with 5 of 8 scenarios, balanced for data literacy processes required and administration time

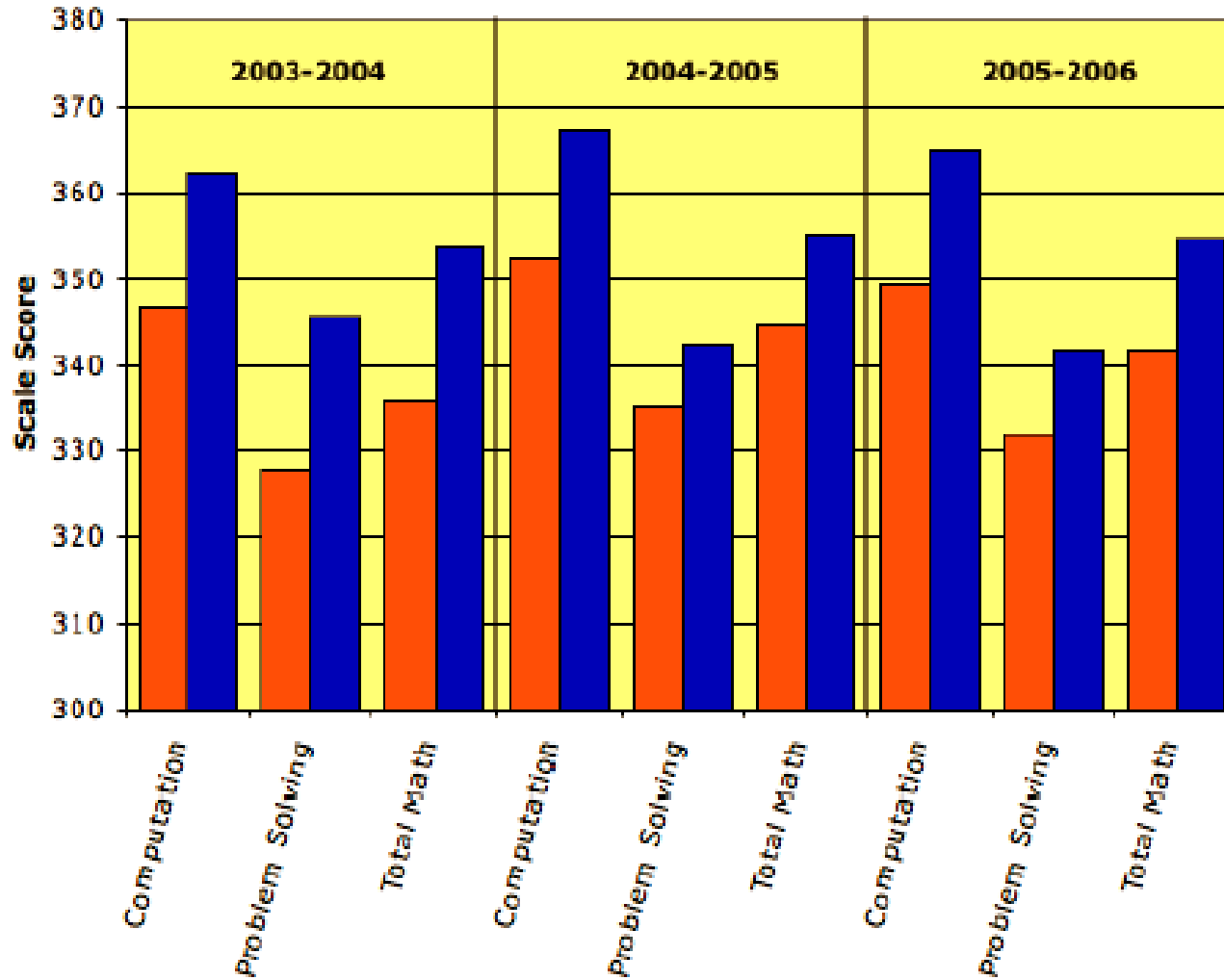
Figure D  
2005–06 Score Levels—English Language Arts (ELA)

English Language Arts Hamilton Elementary									
Grade	Gender	Ethnicity	Number of Students Tested	Percent of Tested Students	Mean Scale Score	Number Students at Each Proficiency Level			
						Below Basic	Basic	Proficient	Advanced
3	Female	African American	18	26%	439	5	7	5	1
		Asian/Pac Islander	1	1%	610	0	0	0	1
		Latino	17	24%	428	5	6	5	1
		White	34	49%	449	4	13	11	6
		<b>Total Female</b>	<b>70</b>	<b>100%</b>	<b>444</b>	<b>14</b>	<b>26</b>	<b>21</b>	<b>9</b>
	Male	African American	18	23%	436	6	6	5	1
		Asian/Pac Islander	2	3%	452	0	1	0	1
		Latino	31	40%	430	8	7	14	2
		White	27	35%	448	6	11	7	3
		<b>Total Male</b>	<b>78</b>	<b>100%</b>	<b>438</b>	<b>20</b>	<b>25</b>	<b>26</b>	<b>7</b>
4	Female	African American	18	24%	441	3	8	5	2
		Asian/Pac Islander	2	3%	462	1	0	1	0
		Latino	36	47%	436	8	12	12	4
		White	20	26%	472	2	7	8	3
		<b>Total Female</b>	<b>76</b>	<b>100%</b>	<b>447</b>	<b>14</b>	<b>27</b>	<b>26</b>	<b>9</b>
	Male	African American	16	23%	442	2	8	5	1
		Asian/Pac Islander	0	0%	NA	0	0	0	0
		Latino	29	42%	438	5	12	10	2
		White	24	35%	456	3	13	5	3
		<b>Total Male</b>	<b>69</b>	<b>100%</b>	<b>445</b>	<b>10</b>	<b>33</b>	<b>20</b>	<b>6</b>

Figure E. Trend Data Bar Graph

### Grade 4 Mathematics

■ Oak School ■ District



# Examples of Items Related to Each Component

Component	Item Prompt	Full-Credit Response
Question Posing	So now in January 2007, what specific data would you want to get from this system to help you decide how to improve your fourth graders' performance?	Teacher picks a logical group and selects a logical measure for that group.
Data Location	What was Oak School's average Total Math Score in 2003-04?	Provides correct answer from graph within 5-point range.
Data Comprehension	Oak School's progress in narrowing the Grade 4 math achievement gap with the rest of the district has been in problem solving rather than computation. (Teacher must agree or disagree and explain reasoning.)	Agrees. Describes data illustrating that the gap between Oak School and district scores decreased more for problem solving than for computation.

# Examples of Items Related to Each Component

Component	Item Prompt	Full-Credit Response
Data Interpretation	These data suggest that next year's third-grade Asian/Pacific Island girls will score better than other third graders on this test.	Disagrees and explains that students in a subgroup vary from year to year and you can not generalize based on just a single Asian student the prior year.
Data Use	Teachers should obtain a detailed breakdown of last year's test results by item or content standard.	Agrees with a reasonable explanation about <i>why</i> having detail is important.

# Sample

- **20 elementary and 7 middle schools in 7 states**
- **147 teachers across all schools**
- **At each school, principals asked to select**
  - **3 teachers who were active in using school data to inform instruction**
  - **3 teachers who were more typical users of data**

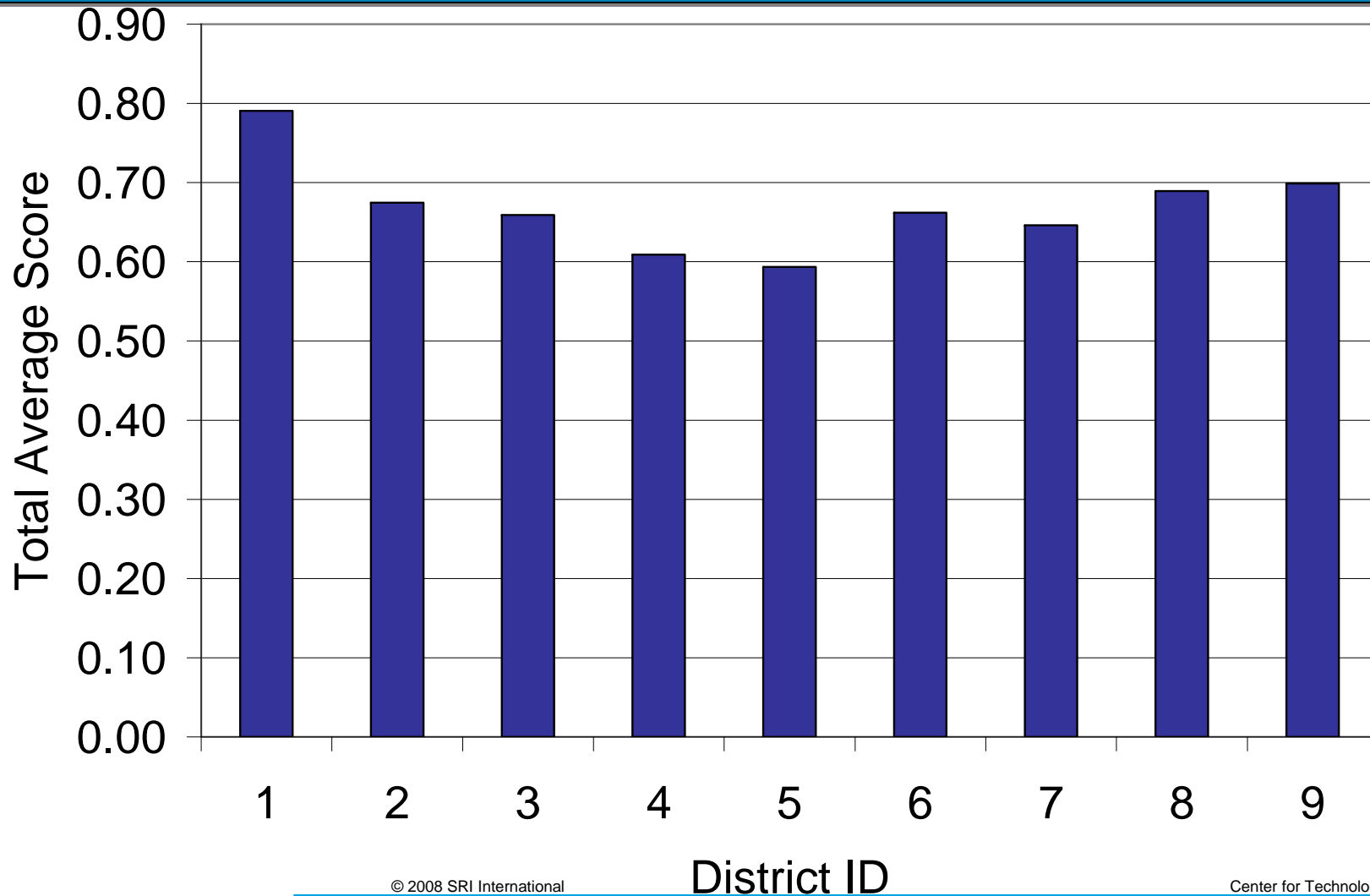
# Data Scenario Administration

- **Random assignment** of teachers/groups to forms before the interview.
- **Two researchers present** for every interview
  - Researcher 1: Ask data scenario questions
  - Researcher 2: Take notes
- **Materials** for teachers
  - Copies of the graphs, tables, and screen shots
  - Paper, pencils, and calculators
- Teachers were asked to **think out loud** as they responded to questions.
- All interviews were **audio-recorded and transcribed** to facilitate scoring and coding of teacher responses to items.

# Data Scenario Scoring

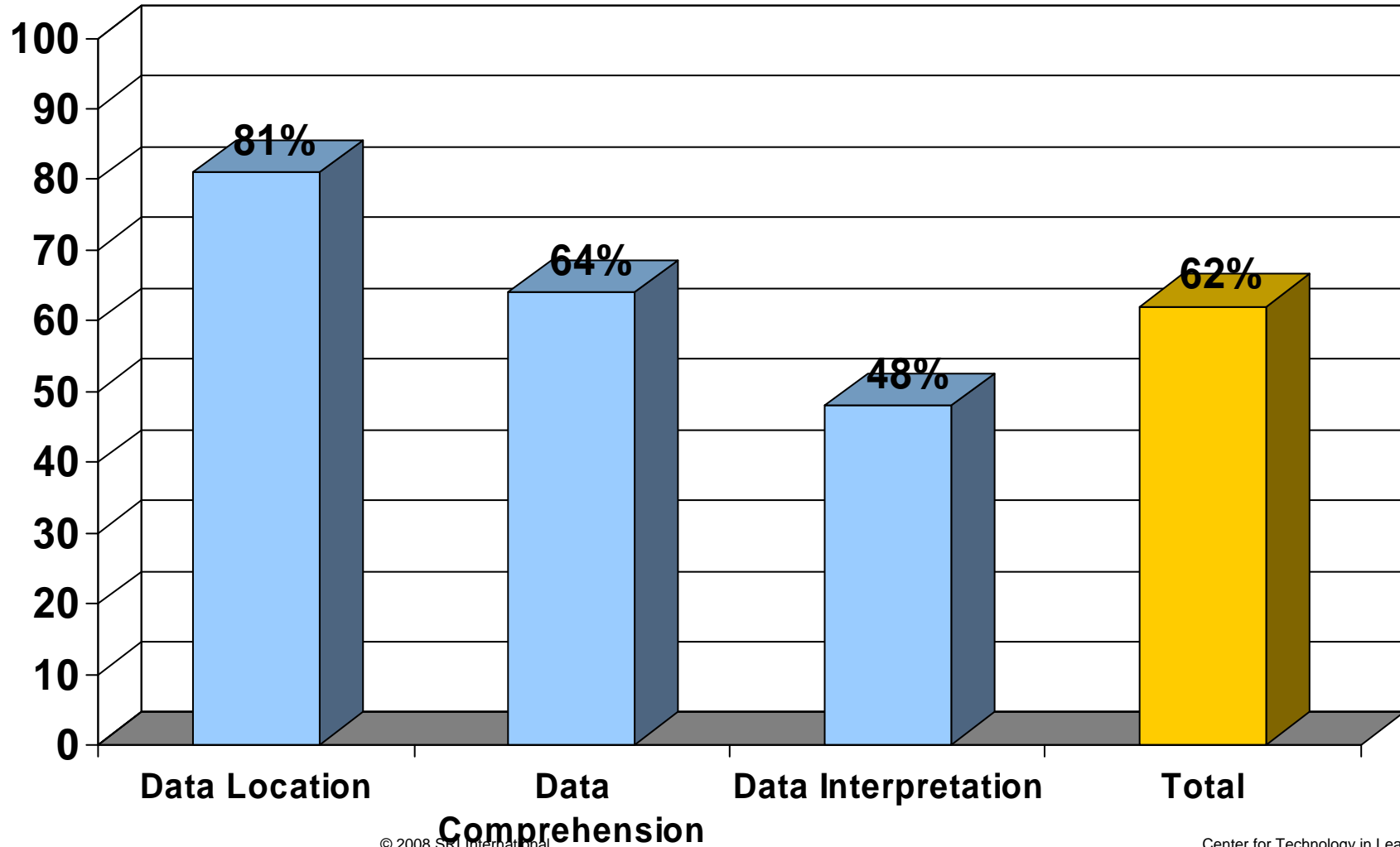
- **Preparation of transcripts**
  - Transcripts were segmented by item in ATLAS.ti
  - Atlas.ti produced data reports by item (i.e., all responses for a given item) to facilitate the scoring of a single item at a time
- **Scoring**
  - 30% of all items were double-coded
    - Interrater agreement was 80% or higher for all items but one.
    - Discrepancies were resolved by consensus.
  - Reliability of total score:  $\alpha = 0.74$

# Total Average Scores for Teachers by District



# Data Literacy Component Scores

*(Average Percentage Correct)*



# Next Steps

- **Explore creating teacher learning communities to support data literacy within and across schools**
- **Use data scenarios as a professional development resource**
  - **Questions linked to specific data literacy processes**
  - **Rubrics available for each question**
  - **Use with individual teachers or groups of teachers**
  - **[www.ed.gov/about/offices/list/oepd/ppss/reports.html](http://www.ed.gov/about/offices/list/oepd/ppss/reports.html)**