

ONPAR Science: Next Generation Testing for ELs

Laura J. Wright

lwright@cal.org

Center for Applied Linguistics

Presentation Overview

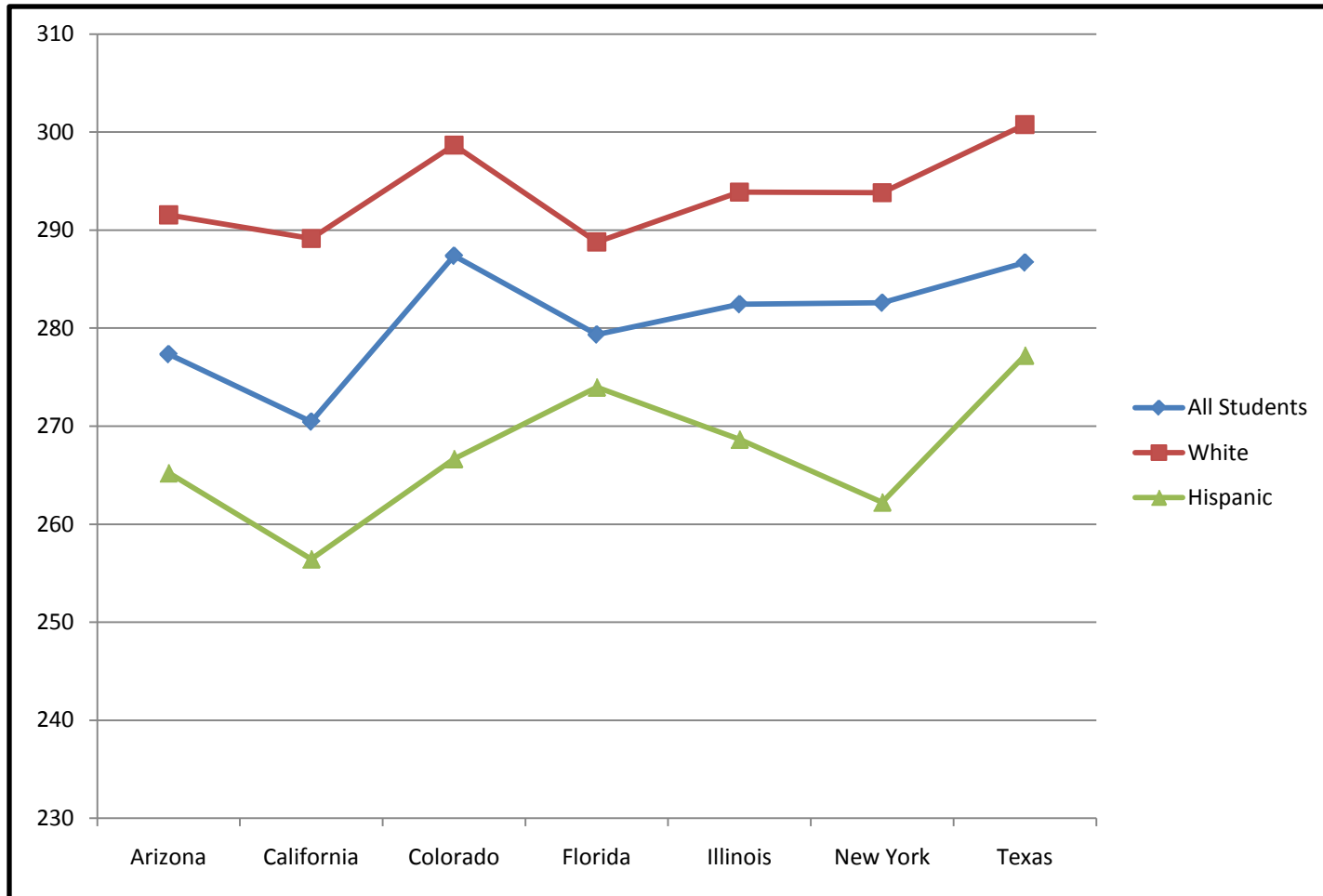
- Policy context
- ONPAR item description and demonstration
- Student interview data
- ONPAR pilot test results
- Summary and questions

Policy Context: Achievement gaps

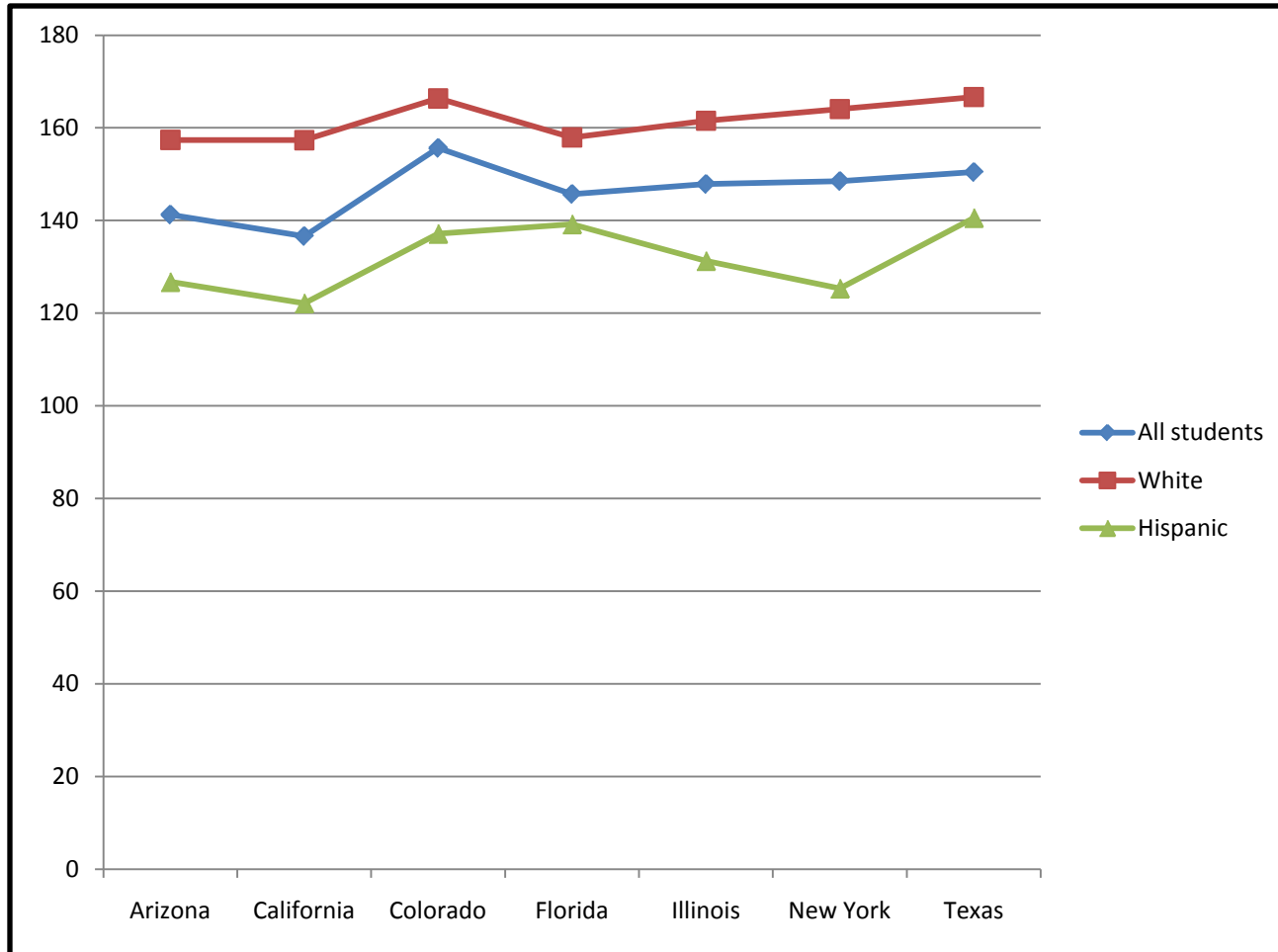


- NCLB requires ELs' participation in standardized content testing (Rivera & Collum, 2006; Menken, 2008)
- Achievement gaps persist for ELs (e.g. Abedi, 2006; Lynch, Kuipers, Pyke, & Szesze, 2005; Valencia, 2002)

NAEP Math scores 2009



NAEP Science Scores 2009



Assessment accommodations

- Content tests often conflate *language ability* with *content knowledge* (Abedi, 2007; Kopriva, 2008; Ruiz de Velasco & Fix, 2002)
- Language is not the construct tested
- ELs typically allowed *accommodations* during content tests
- *An accommodation* is an alteration to either the assessment itself or its administration procedures (see Abedi, 2008; Acosta, Rivera, & Shafer Willner, 2008; and/or Kopriva, 2008 for overviews)
 - Over 75 types of accommodations in use (Rivera, Collum, Shafer Willner, & Sia, 2006)
 - Non linguistic: extra time, orally administered assessment
 - Linguistic: bilingual dictionaries, glossaries, test translations, simplified language

Issues with linguistic accommodations

- Test translation
 - Native language literacy (Genesee, 1994; Stevens, Butler & Castellon-Wellington, 2000; Wright, 2009)
 - Congruency between language of instruction and test (Abedi, Hofstetter & Lord, 2004)
 - Dialect differences of the target language
- Simplified language
 - Difficult to apply simplification principles systematically
 - Modest success in large-scale studies (Hudicourt-Barnes, Noble, Roseberry, Suarez & Warren, 2008; Wolff, Herman, Bachman, Bailey & Griffin, 2008)
- English dictionaries and extra time (Francis, Rivera, Lesaux, Kieffer & Rivera, 2006)
 - Most successful when used in tandem with regular classroom activities

Access-based test: ONPAR

The screenshot shows the ONPAR website homepage. At the top left is the ONPAR logo with the tagline "Innovative Assessment for Diverse Students". To the right is the WIDA Consortium logo. Below the logo is a navigation menu with five items: WELCOME, ONPAR TESTS, RESEARCH & DEVELOPMENT, RESOURCES, and LOGIN. The main content area is divided into two columns. The left column features a large image of a young boy with glasses smiling at a laptop, with the text "ONPAR investigates how to demonstrate the validity of dynamic, interactive, computer-based math & science assessment items." and a "Learn More" button. The right column has a "COLLABORATE WITH US" section with a description of the trial and a list of participation options: Cognitive Labs, Controlled Studies, and Field Tests. Below this are three buttons: "SAMPLE ONPAR ITEMS" and "NEWS & EVENTS". At the bottom, there are three smaller sections: "Parents & Students" with an image of a family holding a paper with an "A+" grade; "Assessment Specialists" with an image of a person using a computer mouse; and "Math & Science Teachers" with an image of a teacher writing the equation $Ax^2 + Bx + C = 0$ on a chalkboard.

ONPAR[®]
Innovative Assessment for Diverse Students

WIDA[®]
CONSORTIUM

WELCOME | ONPAR TESTS | RESEARCH & DEVELOPMENT | RESOURCES | LOGIN

ONPAR investigates how to demonstrate the validity of dynamic, interactive, computer-based math & science assessment items.

[Learn More](#)

COLLABORATE WITH US

Collaborate with ONPAR by participating in a trial that will help develop and implement an accessible and valid criterion-referenced science assessment.

Learn how your school can participate in:

- Cognitive Labs
- Controlled Studies
- Field Tests

[SAMPLE ONPAR ITEMS](#)

[NEWS & EVENTS](#)

Parents & Students

Assessment Specialists

Math & Science Teachers

$Ax^2 + Bx + C = 0$

ONPAR: Access-based framework

- Modifications such as using “plain language, plain formatting, reduced reading load, [and] visuals” (Carr, Kopriva & Rex, 2007: 8)



What will happen to the water level?

Estimate

Question: 3 of 11

Graphic: conveys primary semantic information of item

Text prompt: contains task demand in simple English

Speaker button: provides text prompt translated into Spanish (optional)

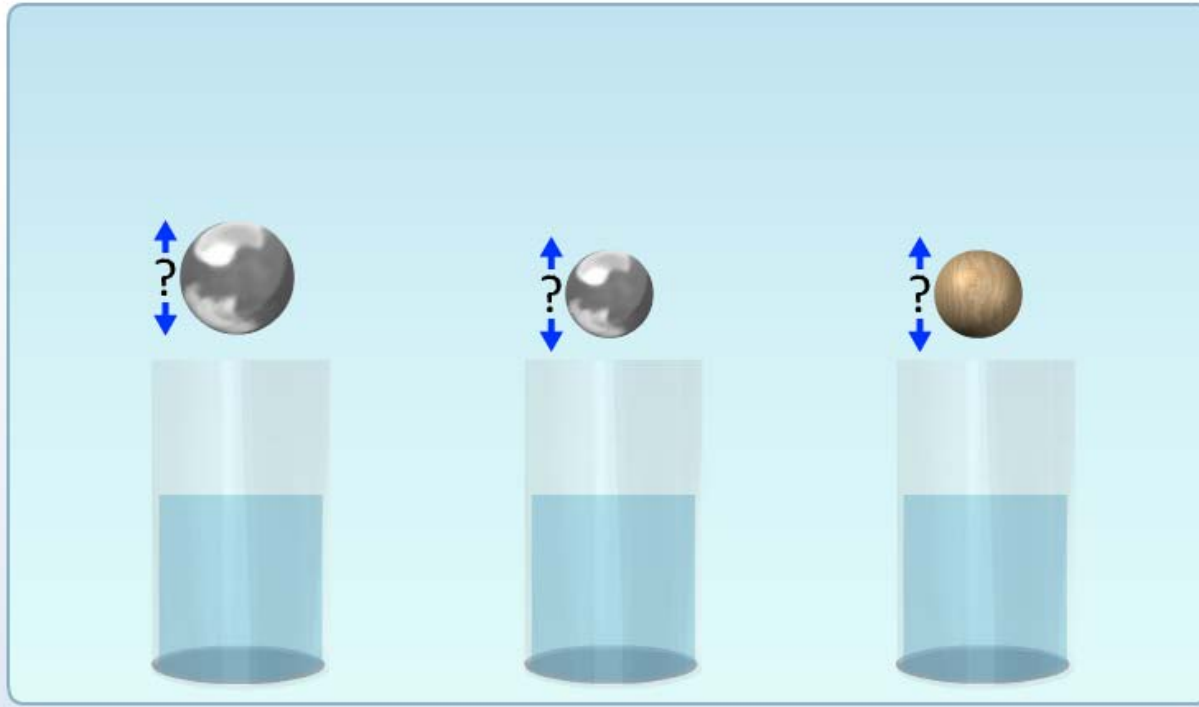
Green Help button: demonstrates action needed to complete task (optional)

Navigation bar: allows students to navigate the assessment at their own pace and replay animations as desired

Sample: Buoyancy



What will happen to the balls?



Go to www.onpar.us for a demonstration of this item

Research Questions

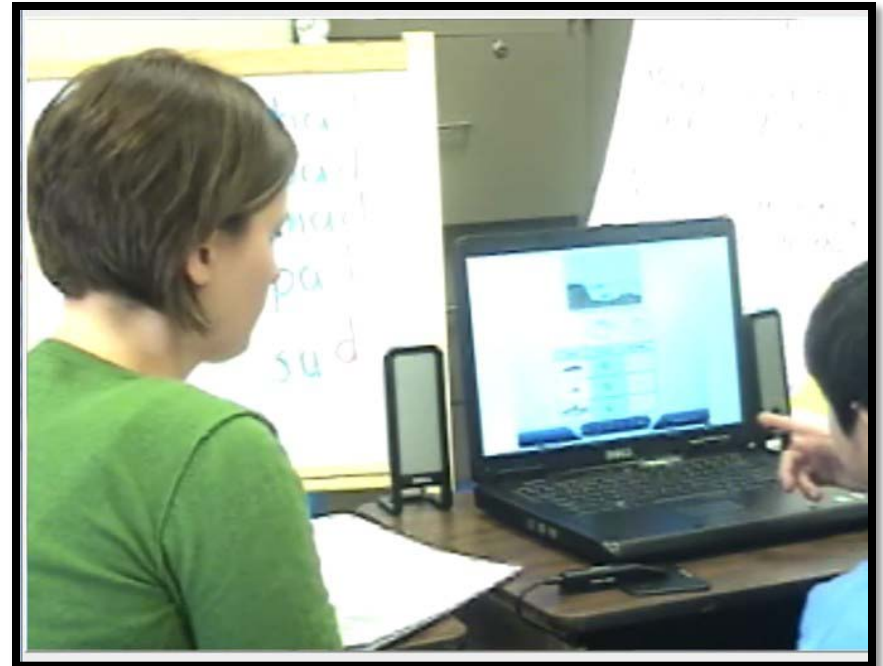
- How do ELs interact with traditional vs. access-based (ONPAR) assessment items?
- What multisemiotic resources do ELs rely upon to access and process ONPAR assessment items?

Cognitive Interviews

- Problem-solving and reasoning, problematic aspects of test items, bias and content issues, sources of DIF (Kopriva, 2008; Paulsen & Levin, 1999)

ONPAR format

- Retrospective questioning
- Translation in Spanish, if requested
- 45-60 minute duration
- Video taped and observation notes taken



Study design

- Discourse analysis of cognitive interviews
- 2 sets of interviews focused on science content and interaction
- Focal study subset of 12 Spanish-speaking students

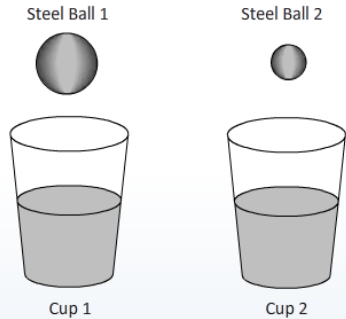
EL level	Number of students in 4 th grade	Number of students in 8 th grade
1&2	7	5
Exited/ bilingual	3	5
Bilingual, never received services	0	3
Total	10	13

Findings overview

- Comparison of student interaction with traditional vs ONPAR test item
 - Buoyancy traditional (released NAEP item)
 - Buoyancy ONPAR
- Student usage of ONPAR resources for accessing and processing information
 - Pictorial elements
 - Simplified English instead of native language
 - Native language support

Difficulty with traditional items

As shown in the picture below, Christina has two identical cups that are filled to the same level with water. She also has two solid steel balls.



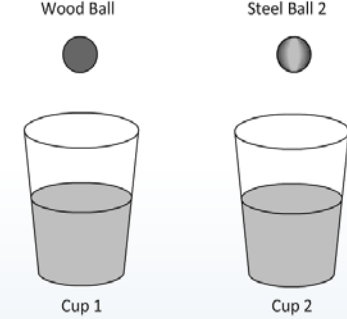
Christina puts ball 1 in cup 1 and ball 2 in cup 2. In which cup will the water level rise the most?

Cup 1

Cup 2

Tell why you think so:

Christina has another ball that is the same size as ball 2, but this ball is made of wood and is hollow.



If she put this hollow ball in one of the cups, do you think the water level would rise more or less than it would if ball 2 were put in the cup?

More

Less

Tell why you think so:

Released 8th grade NAEP science item, 2005

Item rating: easy

62% of students answer this question correctly

Correct: Student response states that the water level goes up more in Cup 1 and gives a correct explanation.

Partially correct: Student response states that the water level goes up more in Cup 1, but no explanation or an incomplete explanation is provided.

Unsatisfactory/Incorrect: Student response states that the water level goes up more in Cup 2, or that Ball 2 pushes the water level higher in Cup 2.

(<http://nces.ed.gov/nationsreportcard/itmrlsx/detail.aspx?subject=science>)

Pepe: Traditional Item

Interviewer: Can you read this one for me?

Pepe: Christina has another ball that is the same size as ball two, but this ball is made of wood .. and is hol (hollow). if the if she put this hol (hollow) .. ball in .. one of the cups, do you think the water level will riza (rise) more or less than it would if the ball two were put in the cup?

Interviewer: So what's happening now? What does Christina have?

Pepe: A ball, that is made of wood and the other one is made of steel.

Interviewer: Okay, and are they different size or the same size?

Pepe: The same.

Interviewer: Okay, and then she has two cups. Is one cup bigger than the other?

Pepe: (silence)

Interviewer: Same- same cups? Okay, so what is the question?

Pepe: (silence) Do you think the water level will .. reez (rise) more or less than it will ball two were put in the cup.

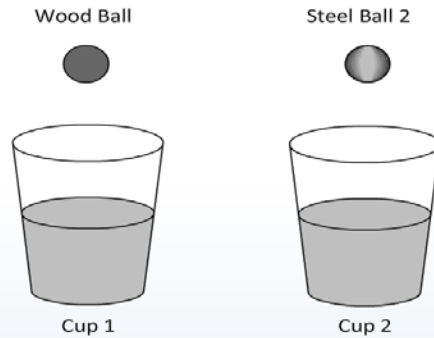
Interviewer: What do you think that means?

Pepe: If they put .. the ball--the both balls together .. on the same (points to screen) ... on the cup. To see if it will have more water than the other one. Or the same, or less.

Interviewer: Very good, and what do you think your answer is?

Pepe: (silence) .. more?

Christina has another ball that is the same size as ball 2, but this ball is made of wood and is hollow.



If she put this hollow ball in one of the cups, do you think the water level would rise more or less than it would if ball 2 were put in the cup?

- More
- Less

Tell why you think so:

Pepe's answer, 4th grade, beginning EL)


Pepe darkens the "More" option and writes:


"becaues one of the ball it made of wod and the other one it made of steel so if I put tha wood ball in the but it well have the same rise of water"

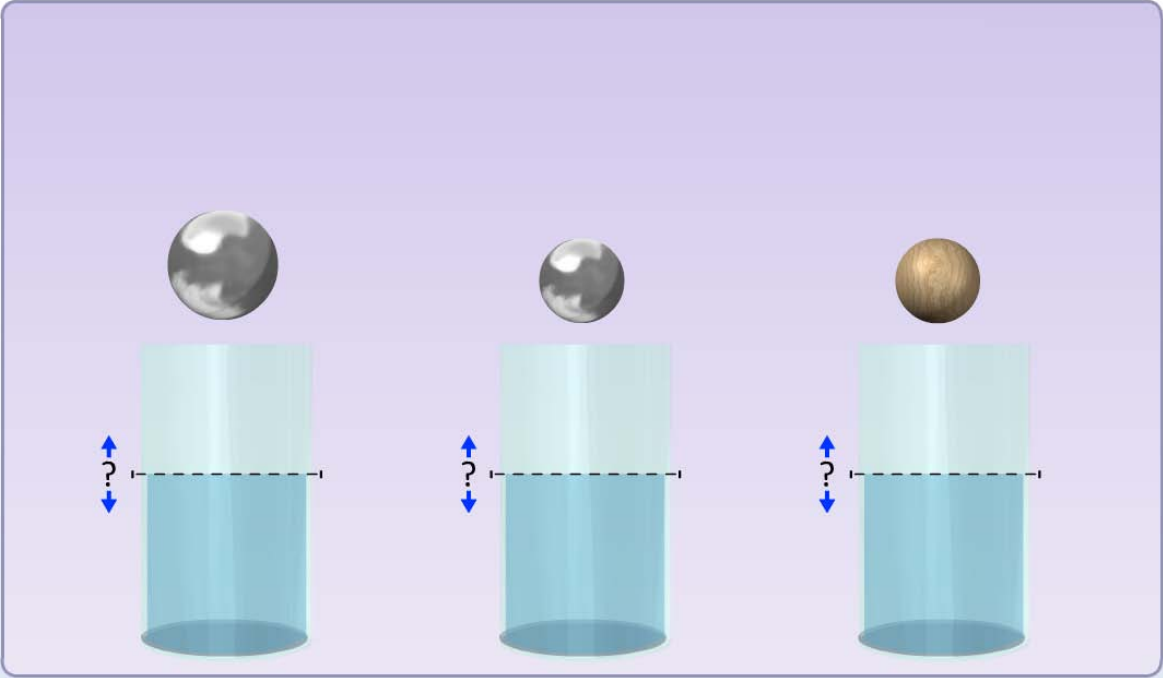
Pepe: Explanation of answer

- Interviewer:** Okay, so, (reading Pepe's answer) *because- because the ball is made of wood and the other is made of steel. So if I put the wood ball it will have the same amount of water will rise? Or more? ...* So your answer is telling me that it's because of the material that it's made out of? But what about the material?
- Pepe:** The wood does not it will stay- it doesn't not have **pressure**.
- Interviewer:** Okay.
- Pepe:** **And if you put the wood ball in the water, it will stay floating.**
- Interviewer:** Oh, okay, the wood will stay floating. How about the steel ball?
- Pepe:** **It will go down and the water will go up.**


ONPAR Buoyancy

 What will happen to the water level?

 Estimate



The diagram shows three identical beakers containing water. Each beaker has a floating object and a dashed horizontal line representing the current water level. A vertical double-headed arrow with a question mark indicates the potential change in water level. The first beaker has a silver sphere floating. The second beaker has a smaller silver sphere floating. The third beaker has a brown sphere floating.

 Question: 3 of 11

ONPAR Buoyancy

Interviewer: Okay, and what's the question?
Cecelia: "What will happen to the water level?"
Interviewer: And what's it asking you, in your own words?
Cecelia: Will the water will go down..or up.
Interviewer: Very good. You want to try to answer the question?
Cecelia: Um (uses the mouse and adjusts the water levels for 7 seconds) Like that. Stay the same.
Interviewer: That one will stay the same line?
Cecelia: The water's not that **heavy**.
Interviewer: Right, and the other--ones, one went up high and one went up...higher. I mean, (points at the screen) it went up, but it didn't go up as high. And w--why did you answer that?
Cecelia: Um, this-one is little, so it goes a little up.
Interviewer: Um-hum.
Cecelia: And this one's bigger, and it goes a lot higher.

Student did not use academic science language to explain the difference, but it is clear that she partly understands the construct and is able to demonstrate understanding with the ONPAR interface.

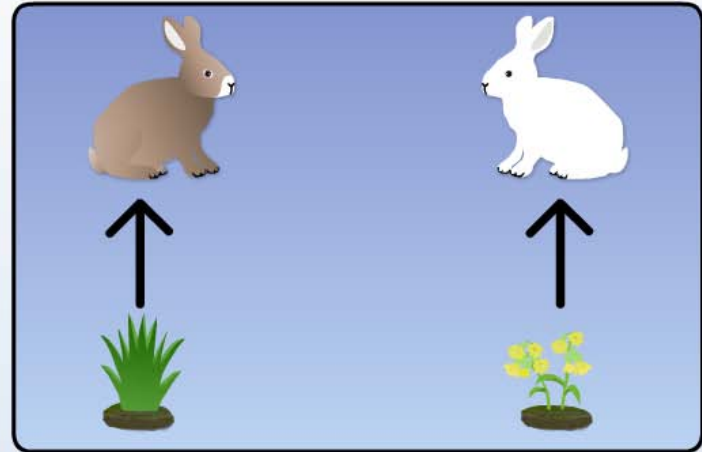
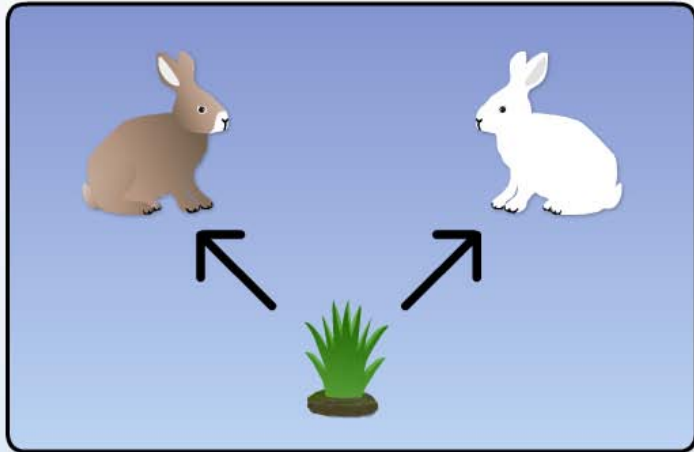
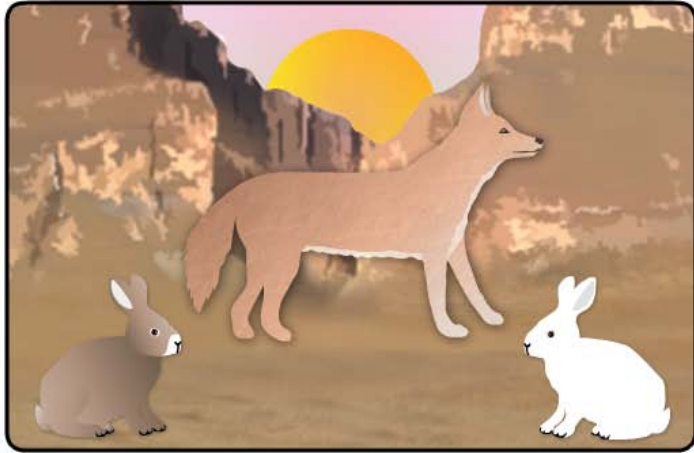
Student usage of ONPAR resources

Pictorial elements

Simplified English

Native language support (speaker button)

Bunny Adaptation




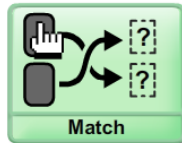
Reliance on pictorial aspects









- Interviewer:** Okay do you know what those arrows mean?
- Jose:** Um-The plants pointing at the rabbit (POINT). What it eats.
- Interviewer:** So what eats..
- Jose:** Both those rabbits eat that (POINTSTO REFER TO PLANTS ON SCREEN).
- Interviewer:** Okay, so both of those (POINT)-rabbits eat this (POINTS TO REFER TO PLANTS ON SCREEN)? Okay.

Jose's pointing gestures demonstrate that he has accessed the semantic information of the graphic without a textual explanation of its meaning. Thus, Jose's use of pointing gestures indicate that the graphics function as meaningful semantic information for him.




Genetics

 Match the parents with the number of offspring.






	X	
	X	
	X	
	X	




?

	102
	0
	98

?

	0
	0
	200

?

	46
	49
	105



Question: 3 of 13

Native language support

Interviewer: -avanzar a la prima pantalla. Sabes lo que te esta preguntando aca?

-move on to the next screen. Do you know what they are asking you here?

Sofia: Eh, que combine que se junta en los pa- los **parents?** No se? O los numeros? (clicks on audio translation button)

Eh, that you combine- that you put together on the pa the parents? I don't know? Or the numbers?

Computer: Empareja los padres con el numero de hijos.


Match the parents with the number of children.

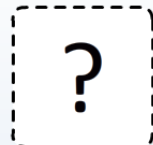
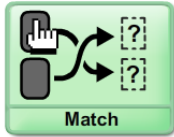
Sofia: Oh! Ah, okay.

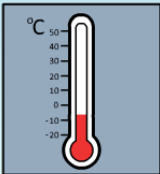
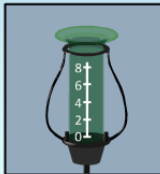
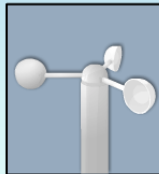
Oh! Ah, okay.

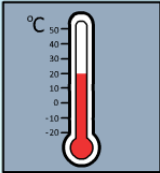
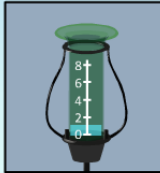
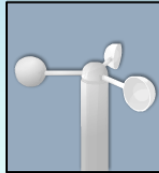
Sofia begins to explain in Spanish, but has difficulty articulating a coherent meaning even though she recognizes some words (“parents” and “number”). She clicks on the speaker button to hear the Spanish translation and responds by saying “oh, ah okay.” The use of “oh” is significant because it is a discourse marker that signifies new information (Schiffrin, 1987). That is to say, the translation provided Sofia with new information she needed to access the meaning of the item and the translation made the item coherent to her. This example shows that even simplified text may pose comprehension difficulties. Coherence requires students to connect vocabulary in a meaningful way, something that may be done more easily in a student’s native language.

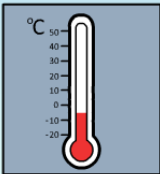
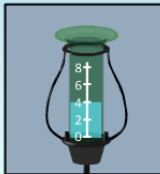
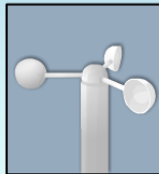
Weather

 Match the weather to the measurements.



 -7°C	 0 cm	 2 km/hr
---	--	--

 20°C	 1 cm	 90 km/hr
---	--	---

 -5°C	 4 cm	 45 km/hr
--	---	--



Question: 1 of 11

Code-switching into English

- Interviewer:** *¿Okay, cual es la pregunta?*
Okay, what is the question?
- Maria:** Match the weather to the .. measurements.
- Interviewer:** *¿Y, en tus propias palabras, que significa?*
And, in your own words, what does it mean?
- Maria:** *Bueno es, el- .. el **weather?***
Well it's, the- .. the weather?
- Interviewer:** *El clima.*
The climate.
- Maria:** *El clima. Eh, los- los **measurements** @@ no me acuerdo como decirlo en Espanol.*
The climate. Eh, the- the measurements @@ I don't remember how to say it in Spanish.
- Interviewer:** Las medidas.
The measurements.
- Maria:** Yeah.

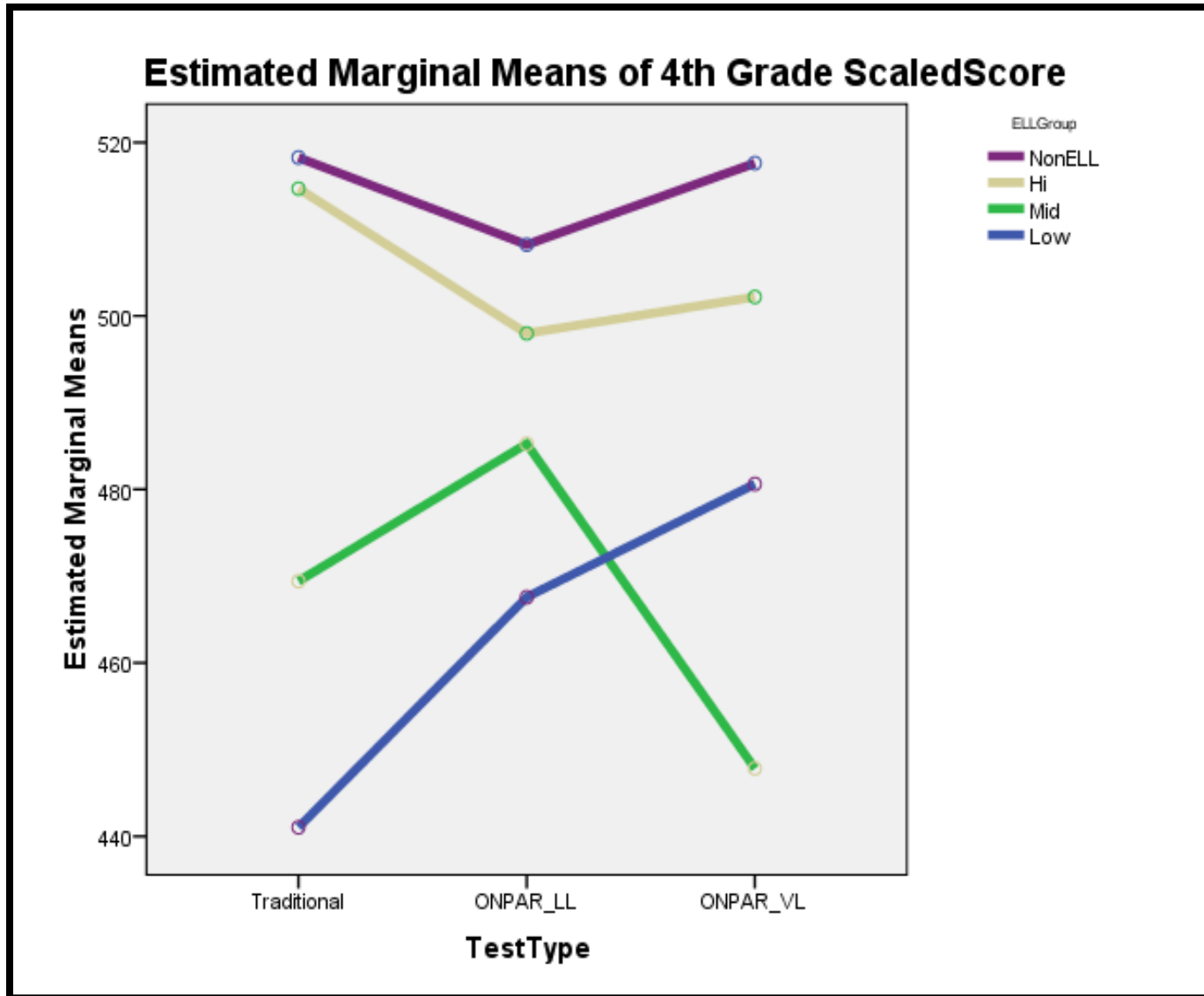
Maria describes the graphic information on the computer screen, listing the types of weather in Spanish and English (la nieve, the clouds). Then, the interviewer asks her to explain the text prompt in her own words, requiring her to translate into Spanish. Maria is unable to articulate two key terms, clima and medidas. It is unclear whether Maria understands the question in English, but does not know the words in Spanish, or if she does not understand the terms in English. However, when answering the question, Maria is able to demonstrate understanding of the concept by correctly matching pictures of weather to the instruments. This example of codeswitching shows how an either/or approach to providing students with one code on a test (e.g., English or Spanish) may not be adequate for ELs.

Profiles of students' strategies

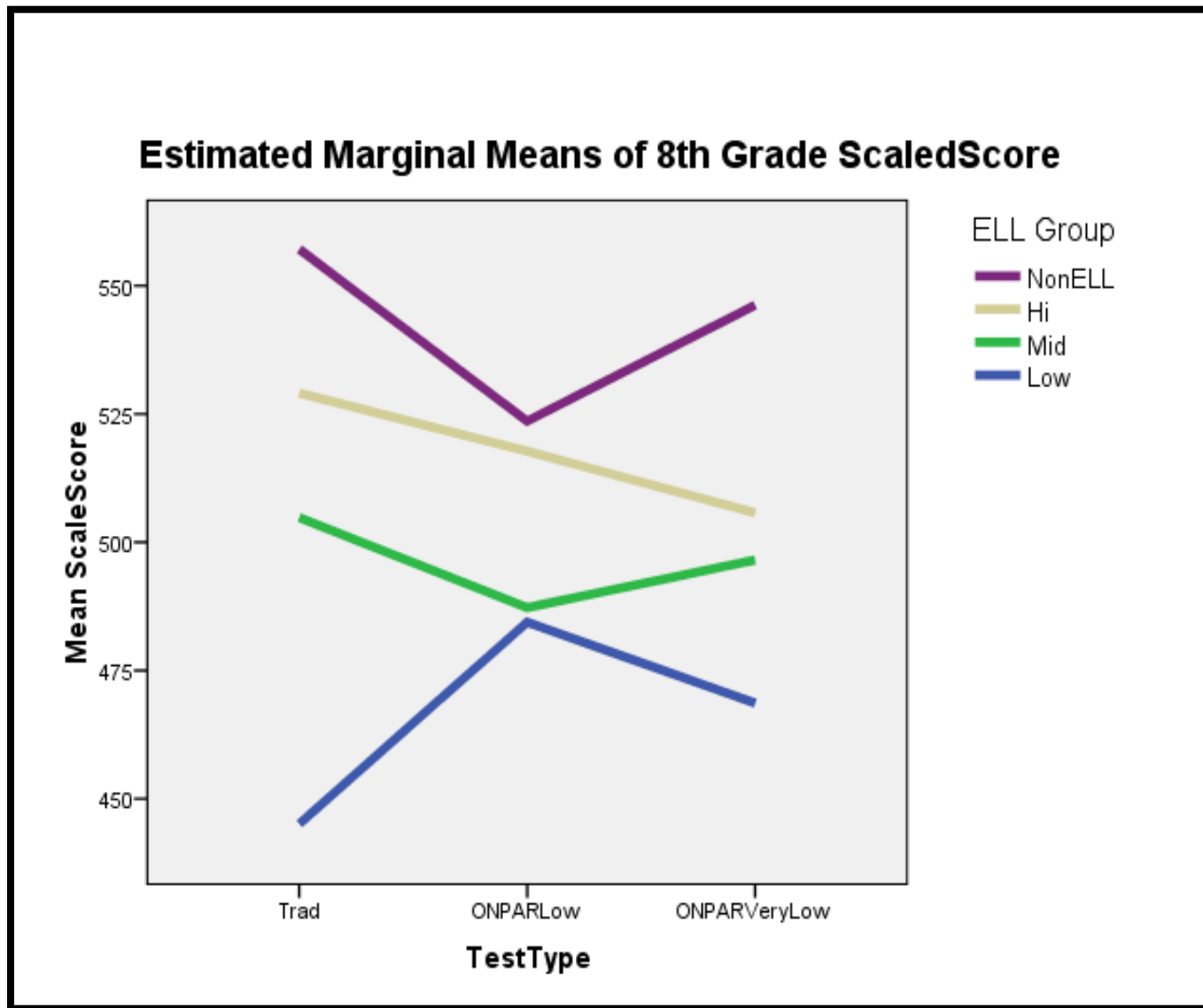
Name	Grade	ELL level	Code Switching	Speaker button	Pointing
Sara	4	I	high	none	none
Pepe	4	I	n/a	none	high
Maria	4	II	high	none	high
Cecelia	4	II	n/a	low	low
Isabel	4	II	n/a	none	low
Ines	4	Exited	n/a	high	high
Jose	4	Exited	n/a	high	moderate
Ana	8	I	low	low	none
Sofia	8	II	moderate	high	low
Elena	8	II	n/a	none	moderate
Marta	8	Exited	n/a	none	low
Marcos	8	Bilingual	n/a	none	low

n/a refers to students who chose to be interviewed in English and whose interviewer did not speak Spanish

4th Grade Pilot test results



8th Grade Pilot Test Results



Discussion

- ‘One-size-fits-all’ accommodations model is not adequate for ELs
- Access-based framework and ONPAR assessments provide multiple routes of access for different students’ needs
- Cognitive interviewing and analysis provides insight into students’ understanding and interactional abilities

Next steps

- Remaining cognitive interviews and item tryouts (high school science- biology and chemistry)
- Pilot test results for ONPAR-Math
- High school science pilot test (Fall, 2011 in Virginia)

Thank you

Laura Wright: lwright@cal.org

Special acknowledgements to Aubrey Logan-Terry for collaboration on the ONPAR cognitive interview analysis and presentation

ONPAR

Rebecca Kopriva, Principal Investigator

Phoebe Winter, Co Principal Investigator

Website: www.onpar.us/

Funding information: Work on ONPAR is sponsored by an Enhanced Assessment Grant (EAG) from the U.S. Department of Education, Office of Elementary and Secondary Education