

# **Science Performance Assessment and English Learners: Results from an Elementary Reform Initiative**

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Santa Cruz – University of California – Los Angeles

NCME Annual Meeting

April 10, 2007 - Chicago, IL

# Motivation for the Study

- Inquiry-Based Science Instruction
- Performance-Based Assessment
- English Learner Students

# Context of the Study

- Multi-district science reform initiative for grades K-5
- Kit-based curriculum, instruction & assessment
- Comprehensive Teacher Professional Development

# Study Sample

- 1 District
- 14 Schools
- 834 Fifth Grade Students
- 68 English Learners

# Performance Assessments

- 5th Grade Level
- Curriculum-Embedded
  - **Ecosystems**
  - **Food Chemistry**
  - **Microworlds**
- Holistic Score
  - 4 = Advanced
  - 3 = Proficient
  - 2 = Partially Proficient
  - 1 = Unsatisfactory

# Research Questions

1. Patterns of performance for all students, English Learners, and different levels of English Learners?
2. Similarities and differences in the above patterns?
3. Extent to which being an English Learner impacts performance?

# Method

- Multiple Regression Analysis
  - Independent variables: ELL, ELL subgroups
  - Dependent variables: assessment scores
- English Learner Subgroups
  - NEP
  - LEP
  - Exit

# Completion Rates

TABLE 1. Completion rates for student groups on the three assessments.<sup>1</sup> (N)

	Ecosystems	Food Chemistry	Microworlds
<b>GENDER</b>			
Female	365	351	368
Male	362	343	363
<b>ENGLISH LEARNER</b>			
Exit <sup>2</sup>	9	11	11
LEP	34	42	43
NEP	8	8	8
<b>ETHNICITY<sup>3</sup></b>			
American Indian/Alaskan Native	16	17	17
Asian	28	30	29
Black	199	178	196
Hispanic	247	242	250
White	235	225	237
<b>SOCIO-ECONOMIC STATUS</b>			
Free/Reduced Lunch	488	467	502
<b>SPECIAL EDUCATIONAL NEEDS</b>			
Special Educational Needs <sup>4</sup>	74	68	75
<b>GIFTED AND TALENTED</b>			
Gifted	34	30	41
Total Sample	727	694	731

<sup>1</sup> Total sample includes 834 unique students.

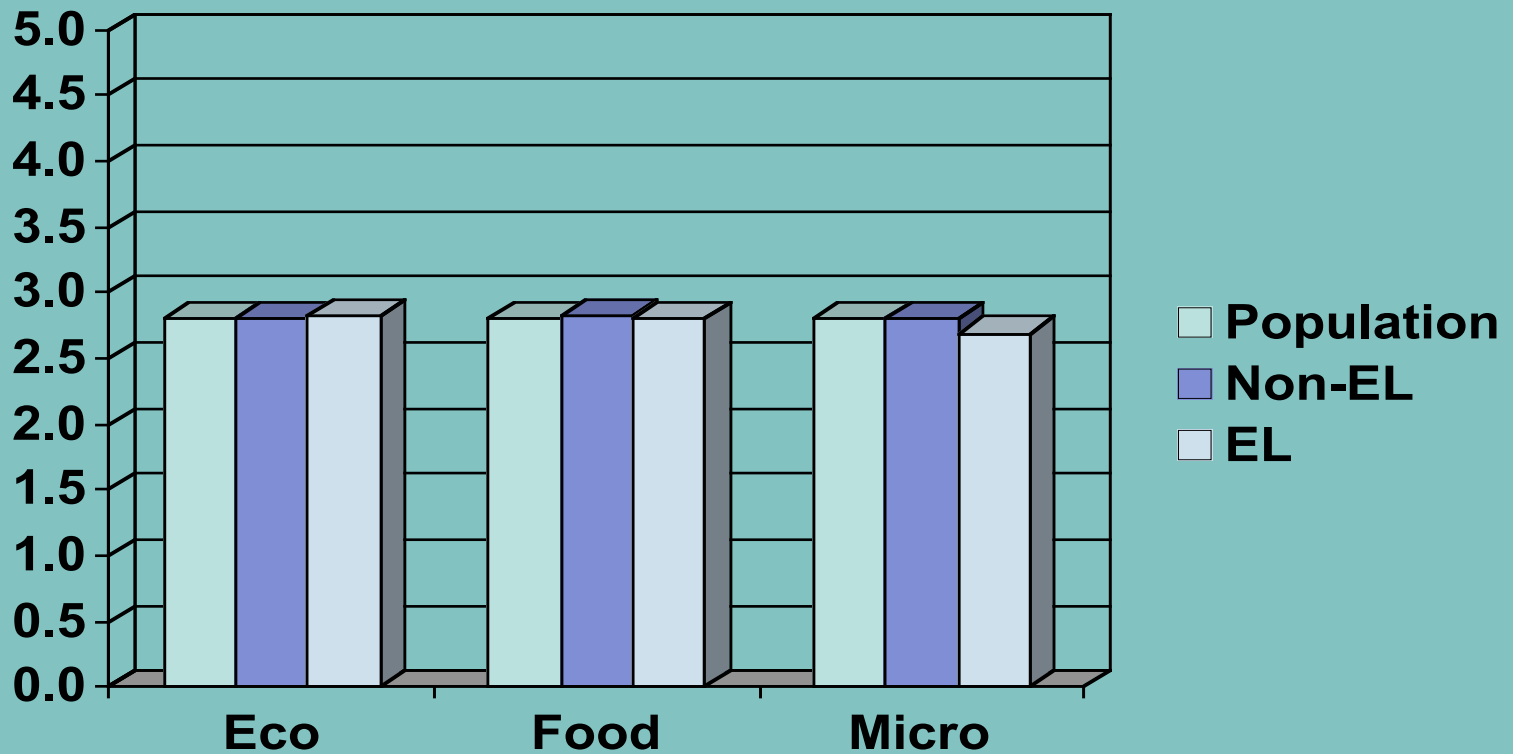
<sup>2</sup> Includes Exit, Exit1, Exit3

<sup>3</sup> Two students declined to report ethnicity

<sup>4</sup> Includes Autism, Multiple Disabilities (MD), Perceptual or Communicative Disability (PCD), Physical Disability (PD), Significant Identifiable Emotional Disability (SIED), Significant Limited Intellectual Capacity (SLIC), Speech-language Disability (S/L).

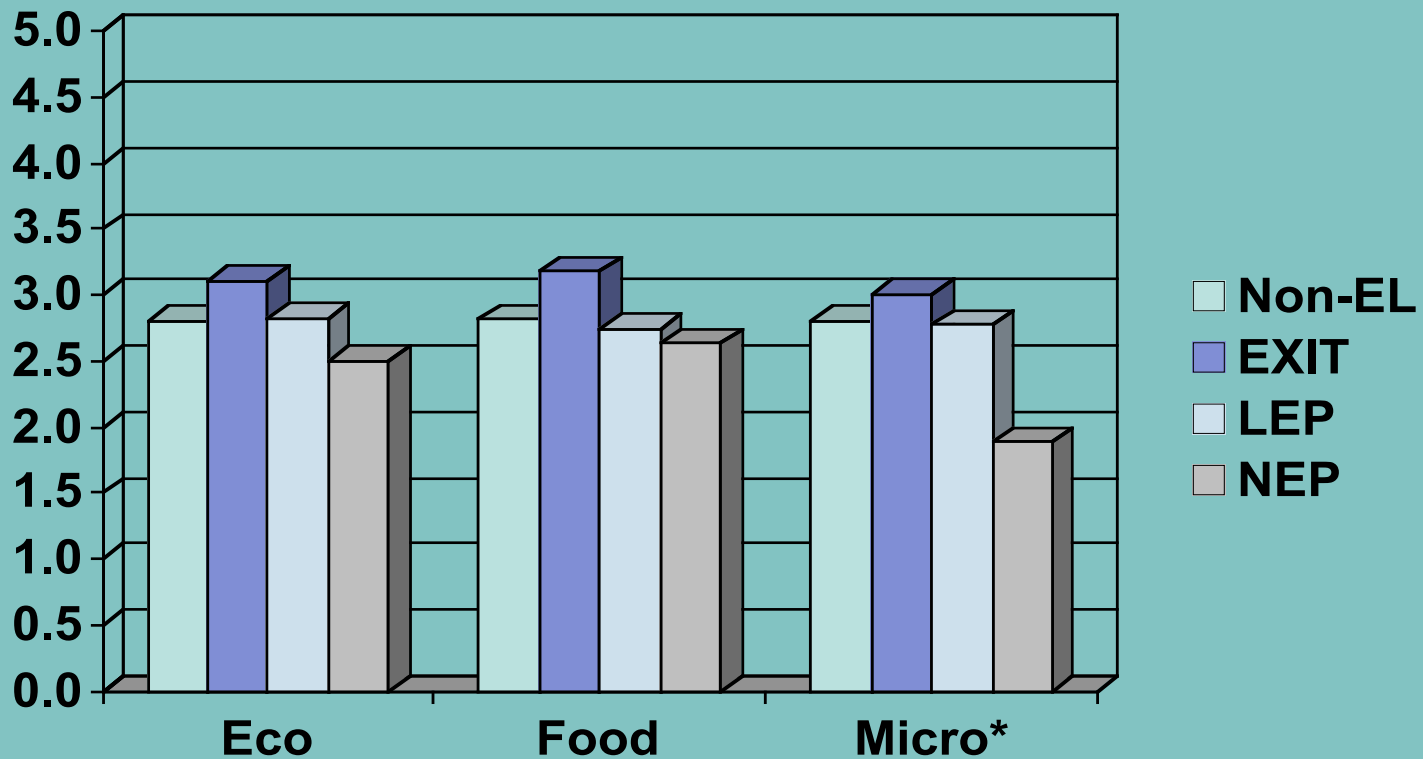


# Overall Performance



“Universal Mean” = 2.8 (Proficient)

# EL Subgroup Performance



\* Significant at  $p < .01$

# Regression Coefficients

TABLE 4. Summary of regression coefficients for all three assessments.

Variables	Ecosystems			Food Chemistry			Microworlds		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Constant	3.05	.072		3.18	.073		3.08	.068	
Male	-.191	.061	-.114**	-.298	.062	-.174***	-.200	.056	-.124***
Exit	.263	.276	.035	.453	.250	.066	.156	.233	.024
LEP	-.007	.149	-.002	-.003	.136	-.009	-.092	.126	-.027
NEP	-.304	.291	-.038	.002	.290	.002	-.817	.271	-.106**
Indian/Alaskan	-.270	.211	-.047	-.319	.205	-.058	-.274	.190	-.051
Asian	.238	.163	.055	.226	.157	.054	.199	.149	.048
Black	-.124	.079	-.066	-.171	.082	-.087*	-.190	.073	-.105**
Hispanic	-.006	.080	-.003	-.237	.081	-.132**	-.044	.074	-.026
SES	-.153	.066	-.086*	-.084	.067	-.046	-.107	.062	-.062
Special	-.381	.101	-.138***	-.587	.105	-.204***	-.558	.093	-.211***
Gifted	.438	.144	.111**	.553	.152	.131***	.568	.127	.157***

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

# Underperformance

<b>ECO</b>	<b>FOOD</b>	<b>MICRO</b>
<ul style="list-style-type: none"><li>• Male</li><li>• Special Ed*</li><li>• Non-Gifted*</li><li>• Low SES</li></ul>	<ul style="list-style-type: none"><li>• Male</li><li>• Special Ed*</li><li>• Non-Gifted*</li><li>• Black</li><li>• Hispanic</li></ul>	<ul style="list-style-type: none"><li>• Male</li><li>• Special Ed*</li><li>• Non-Gifted*</li><li>• Black</li><li>• NEP*</li></ul>

\* Statistically and “practically” significant  
(i.e., half point or more from reference group mean)

# Effect Sizes

TABLE 5. Effect sizes of models.

	Ecosystems		Food Chemistry		Microworlds	
	Adj. R <sup>2</sup>	Effect size (f <sup>2</sup> )	Adj. R <sup>2</sup>	Effect size (f <sup>2</sup> )	Adj. R <sup>2</sup>	Effect size (f <sup>2</sup> )
Complete Model <sup>1</sup>	.062	.066	.120	.136	.127	.138
Ethnicity Only <sup>2</sup>	.012	.012	.026	.027	.021	.022
EL Only <sup>3</sup>	.000 <sup>^</sup>	-	.000 <sup>^</sup>	-	.016	.016

<sup>1</sup>Includes all variables (all sub-designations for Gender, English Learner, Ethnicity, SES, Special Education, and Gifted and Talented)

<sup>2</sup>Includes only Ethnicity variables (American Indian/Alaskan Native, Asian, Black, Hispanic, and White)

<sup>3</sup>Includes only English Learner variables (Exit, LEP, NEP)

<sup>^</sup>Models non-significant at p<.01

Note: An effect size (f<sup>2</sup>) of 0.02, 0.15, and 0.35 are considered small, medium, and large, respectively (Cohen, 1988).

# Impact of Student Variables

	<b>ECO</b>	<b>FOOD</b>	<b>MICRO</b>
<b>EL</b>	• negligible	• negligible	• small
<b>Ethnicity</b>	• small	• small	• small
<b>All</b>	• medium	• medium	• medium

Per Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: LEA.

# Summary

- “Universal” Proficiency
- Increases in English proficiency = Increases in student score (n.s.)
- EL status *not* a predictor of student performance overall
- NEP “Partially Proficient” on **Microworlds**

# Limitations

- Single year's data
- Informally validated assessments
- Unknown inter-rater reliability
- “Hegemonic” English Learner
- Presumed Opportunity to Learn



# Implications

- Curriculum-embedded science performance assessments may level the playing field for ELs
- Value of aligned curriculum, instruction & assessment supported by related teacher professional development
- Investigate more years & **Microworlds**

# Contact us

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