

Problem Solving Process Skills and 4th Grade English Language Learners

A presentation by

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Presentation Outline

- **Introduction/Review of the Literature**
- **TAKS Results**
- **Purpose of the Study**
- **Research Questions/Data Analysis**
- **Procedure**
- **Instrument**
- **Results**
- **Implications for Teaching**

Facts

- **According to U.S. Census Bureau (2000), one fifth of the students enrolled in the public school system are second language learners**
- **Of these second language learners, Hispanics represented the largest group**
- **Historically, Hispanic bilingual students have had the lowest levels of education and the highest dropout rate of any ethnic group in the country:**
30% for Hispanics
13% for African-Americans
8% for Whites

Purpose of the Study

- **Lack of relevant research in the area**
- **Identification of the specific areas where Hispanic students identified as English Language Learners (ELL) are having difficulties when solving routine three digit subtraction word problems with regrouping in relation to five processes of mathematical problem solving**

- Examining the relationship between each of the five processes of mathematical problem solving and the ability of a Hispanic ELL to arrive at the correct final answer to a three-digit subtraction problem with regrouping
- Information is helpful to educators as they work to develop effective teaching strategies that will help all students to succeed
- The performance of students on state and national assessments is continually gaining importance. Therefore, it is necessary for teachers to find ways in which students can improve their performance on these examinations.

Texas Assessment of Knowledge and Skills Results (TAKS)

- In Texas, the majority of students attending public schools are Hispanic (43%)
- 14%+ of students are classified as Bilingual/ESL (approx. 586,146+)
- 2005 TAKS % Students Passing-4th grade
(Source: Texas Education Agency)

	All tests	Math
African American	55 4*	67 14*
Hispanic	63 5*	76 21*
White	81 14*	90 39*
ELL	49 3*	68 14*

***commended performance**

Problem Solving Processes for Research Study

- explaining the problem
- estimating the final answer
- representing the problem
- solving the representation
- explaining the final answer

Research Question

1. Which of the following problem solving process skills are problematic for Hispanic bilingual fourth graders when solving routine three-digit subtraction story problems:

- (1) explaining the problem
- (2) estimating the final answer
- (3) representing the problem
- (4) solving the representation
- (5) explaining the final answer

Data Analysis:

Display with the mean score earned and standard deviation for each of the process skills

Research Question

2. Which of the following problem solving process skills serve as predictors for students (Hispanic bilingual fourth graders) being able to arrive at the correct final answer when solving three-digit subtraction story problems with regrouping:

- (1) explaining the problem
- (2) estimating the final answer
- (3) representing the problem
- (4) solving the representation
- (5) explaining the final answer

Data Analysis:

Wilk's lambda stepwise method

All Possible-Subsets Approach

Procedure

- 74 bilingual fourth grade students
- 2 Independent School Districts in Texas
- Students were individually assessed on two mathematics problems, each involving the five process skills
- Students chose language of assessment
- Students received a score from 0-4 for each process skill based on performance:
0, 1, 2 = below expectations
3, 4 = meets expectations

Results: Question 1

Mean Scores by Problem and Process

Problem A

	Mean	SD
Process 1	3.32	0.85
Process 2	2.19*	1.26
Process 3	3.69	0.74
Process 4	3.55	0.80
Process 5	3.45	0.58

Problem B

	Mean	SD
Process 1	3.58	0.60
Process 2	2.27*	1.38
Process 3	3.64	0.79
Process 4	3.77	0.61
Process 5	3.47	0.62

Results: Question 2

Wilk's Lambda Stepwise Method

Tests of Equality of Group Means for Subtraction Problem B
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	Wilk's Lambda	F	df1	df2	Significance
Process 1	0.98	1.86	1	72	0.18
Process 2	0.99	0.64	1	72	0.43
Process 3	0.60	48.99	1	72	0.00*
Process 4	0.58	51.55	1	72	0.00*
Process 5	0.99	0.71	1	72	0.40

PUBLICATIONS

Cuellar, R., Cmajdalka, S., & De la Colina, M. (2004). Problematic problem solving process skills in subtraction for Hispanic English language learners. *The International Journal of Learning*, 11, 1275-1281. Available on-line @ www.learning-journal.com.

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