

# Sul Ross State University

A Member of The Texas State University System

## Mathematics and English Language Learners: A Review of the Literature

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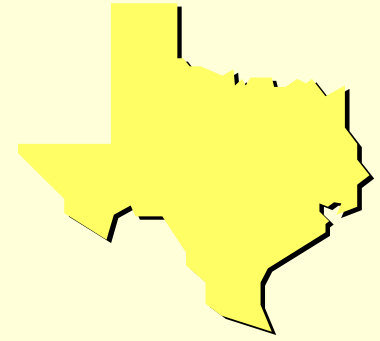
Austin, Texas

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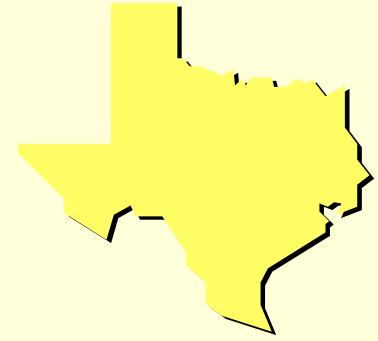
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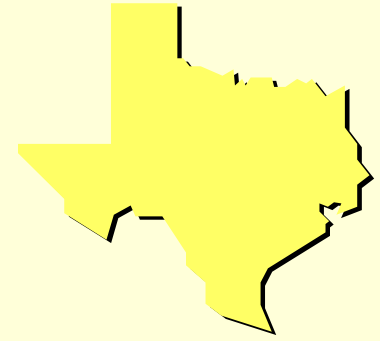
## Focus of Project:

- To review literature regarding ELL and the teaching of mathematics for secondary & elementary students
- The goal was to identify what has worked
- But, the number of research studies is minimal
- However, there is much discussion on the topic of ELL in general
- Refocus: *We know what's there. What's not there?*
- Set the this work within a greater context of ELL and pose suggestions for new directions for research and practice



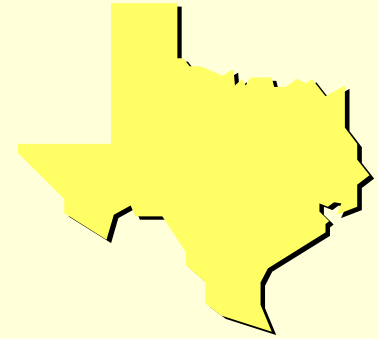
## Began with a wide net:

- Reviewed over 300 articles with any connection to “mathematics” and “ELL”
- Identified *studies*—with at least an identified sample and some specified program or procedure with “mathematics” and “ELL students” regardless of grade level
- Reviewed reports from established organizations, particularly as they serve bilingual, ELL, L2 acquisition populations
- Reviewed websites, e-documents, homepages of organizations and individuals regarding ELL research or practice
- Attended conferences on ELL students



## Components of the Literature Review:

- Mathematics and High School ELLs
- Mathematics and Middle School ELLs
- Mathematics and Elementary ELLs
- Composite Review



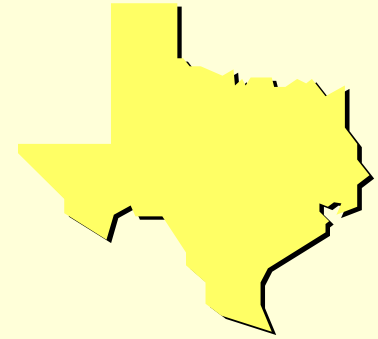
## Texas and LEP students:

### Instruction of LEP students in Texas

- More than 10 percent of Texas public school students are identified as limited English proficient. According to data collected through the TEA Public Education Information Management System (PEIMS) in the 1999-2000 school year, 555,470 LEP students were enrolled in public schools. In the nation Texas ranks second to California in terms of number of LEP students enrolled.
- LEP students are served through bilingual education or ESL programs until they are identified as English proficient based on state-determined criteria. Once they have met the criteria, they exit these special language programs and are no longer identified as limited English proficient.

### Language Groups Represented in Texas LEP Student Population

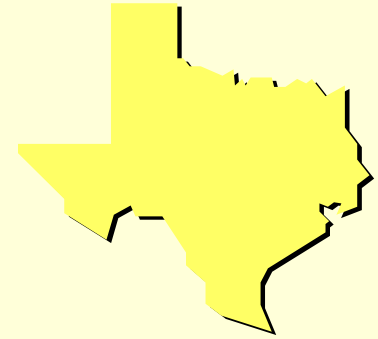
- According to PEIMS data for the 1999-2000 school year, more than 90 percent of Texas LEP students speak Spanish as their primary language. A small but significant number of LEP students speak a variety of other languages, with Vietnamese, Chinese, and Korean being the most prevalent. Responses to teacher surveys administered during the development of the RPTE suggest that there are more than 100 different home languages represented in the Texas LEP student population.



## Findings & Recommendations:

### Findings in the Literature:

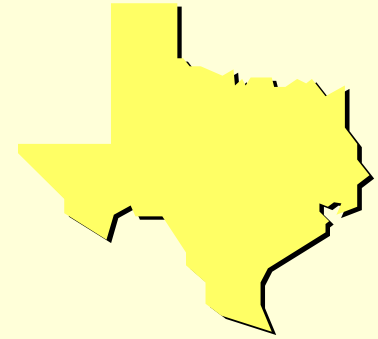
- There is a paucity of research specific to mathematics and ELL students
- Even in the literature present on mathematics and ELL students, the consensus is that content mastery and the principles of literacy are tied together—content and literacy go hand-in-hand
- Two-way dual language programs hold the most promise for all content delivery (see Thomas & Collier, 2002)
- Difficulty in the translation of word problems is universal (K-16), not just limited to ELL students in particular
- Math scores statewide are below acceptable levels in all student categories, particularly at Algebra I
- That mathematics has a natural language register and a formal content language register and the teaching of these registers is critical to student's understanding of math, beginning in the elementary school



## Findings & Recommendations:

### **Findings Hinted at, but Not Discussed in the Literature:**

- The compartmentalization of contexts so that students fail to see connections across subject areas; this is particularly true in secondary education environments
- Teaching for understanding as a goal of instruction for all content areas
- Teachers, particularly elementary teachers, may not be skilled in the technical aspects of mathematics register and how to teach it effectively
- The power relationship effects inherent in US school classrooms—English is dominant, all other languages are secondary; with the exception of dual language programs, all programs seek to change minority students to be like the majority
- The role and influence of the principal
- The role and influence of the teacher

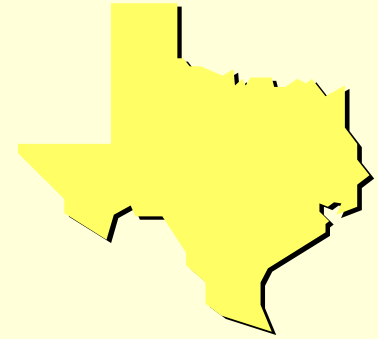


## Findings & Recommendations:

### What's Not in the Literature:

- The difference between how mathematics is taught in other countries and how it is taught in the US (i.e., conceptually-based vs. process-based; see TIMSS studies)
- The acknowledgement that math scores statewide in particular may be indicative of ineffective teaching strategies for all students and that the math curriculum needs to be revamped to reflect a different mode of instructional focus (i.e., cover less more deeply)





## Findings & Recommendations:

### Recommendations:

- Support and fund research to continue defining programs that tie literacy to content instruction, particularly as it concerns mathematics, such as SLAMS (Cuevas, 1981, 1984, 1992)
- Support and fund the development of Two-way dual language programs at all school levels
- Support and fund programs to teach and implement instructional strategies such as Instructional Conversations, Concept/thematic instructional practices, etc.
- Support and fund professional development for teachers regarding needs of ELL students and instructional practices that support ELL students (see CREDE Five Standards for Effective Pedagogy and Student Outcomes)
- Examine teacher preparation programs; require elementary teachers to have formal training in math instruction, particularly in math register, and/or in instructional strategies that facilitate development of literacy and math skills
- Support changes in math instruction from process to conceptual foundations, particularly from K-8 and possibly for Algebra I students
- Rewrite math TEKS to support depth rather than breadth in instructional focus