

# Mathematics for English Language Learners (MELL)

January 9–12, 2006

TEKS Refinement TOT Training

Arlington, Texas

# A Place to Begin

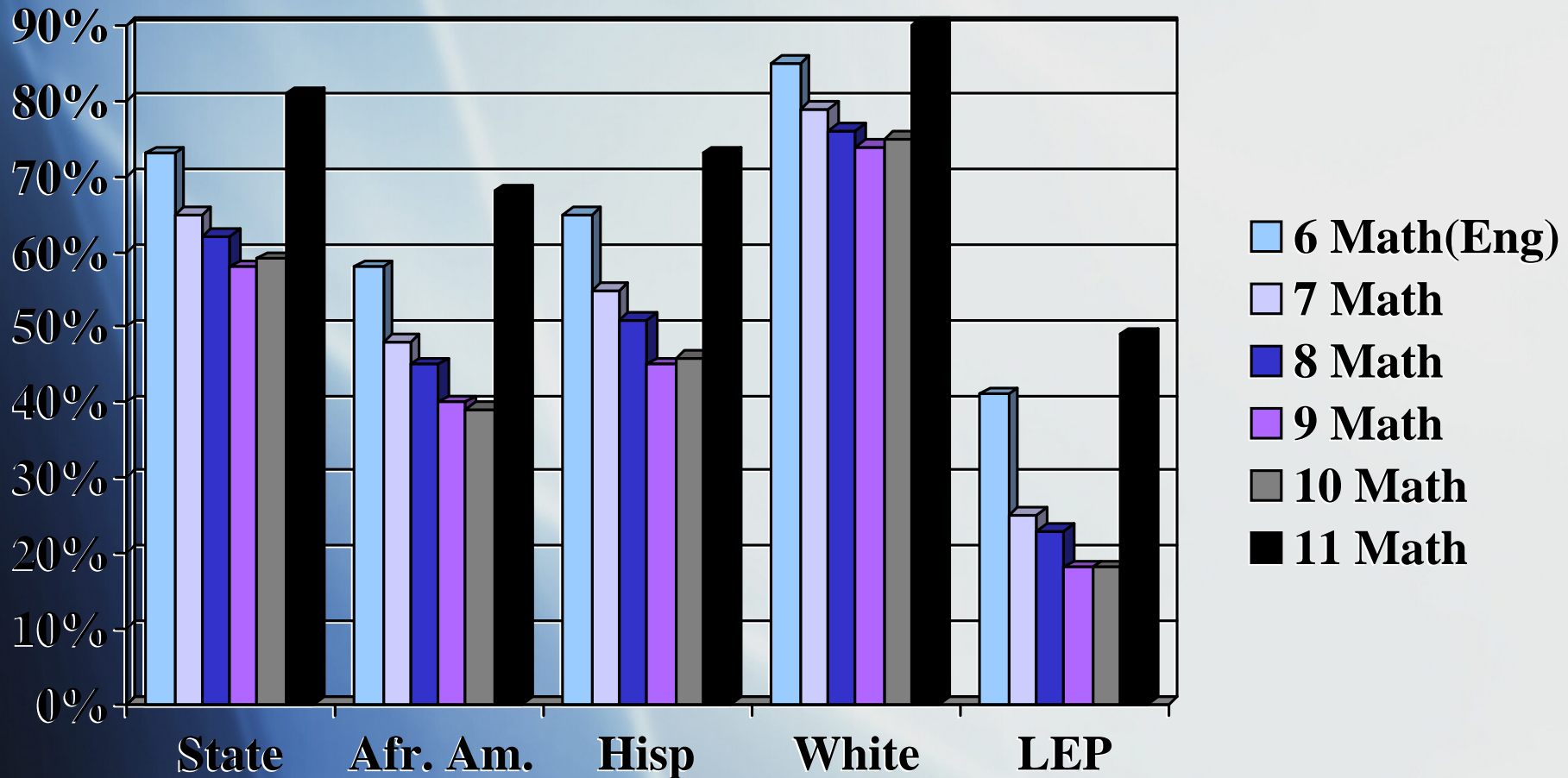
- Underlying Assumptions
  - Teachers have very “full plates” and many demands
  - TAKS standards are substantive and challenging
  - ELL students face additional challenges that are currently reflected in TAKS results

# A Place to Begin, Continued

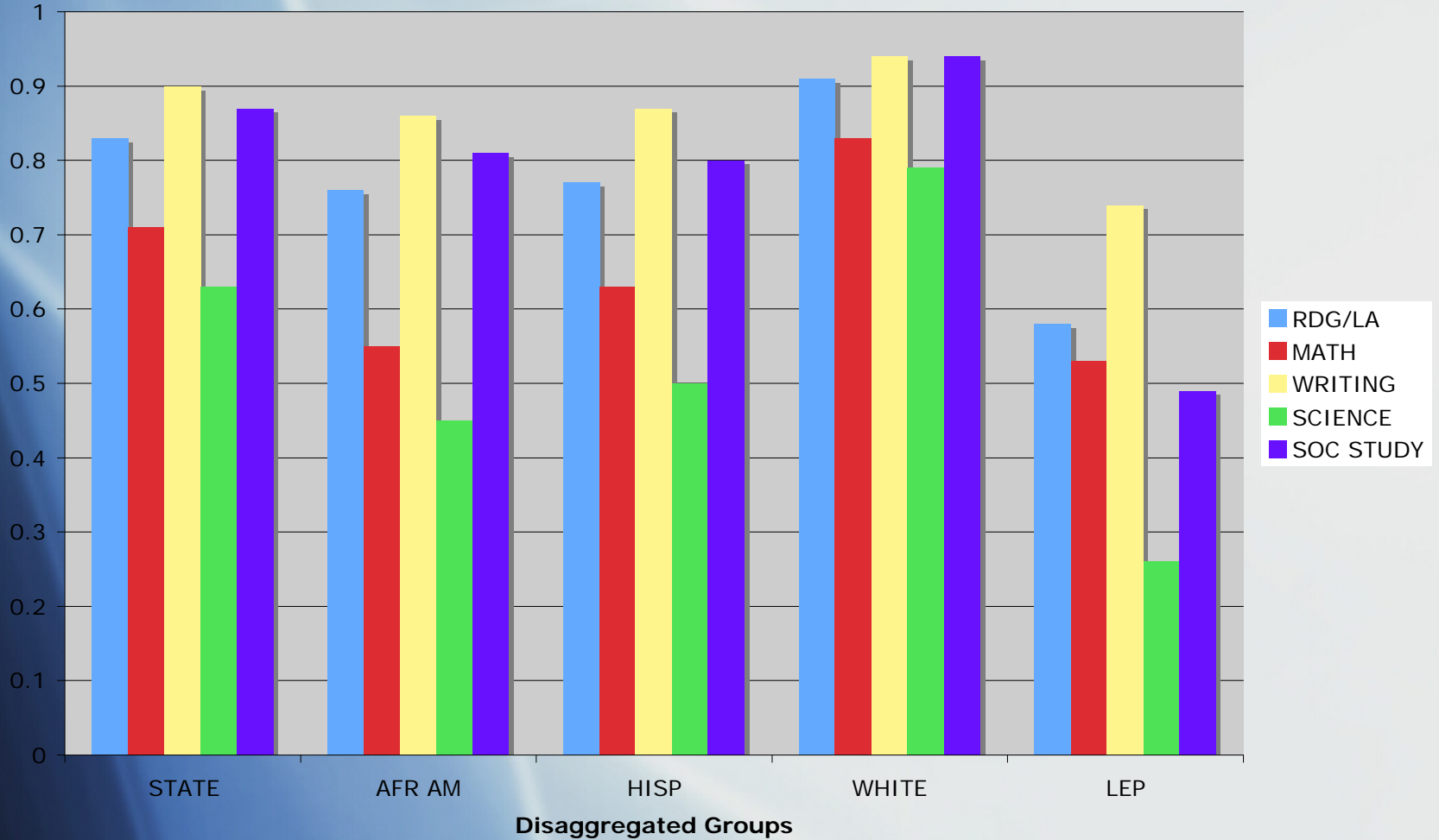
- Underlying Assumptions
  - Texas educators are working hard to improve the performance of all students, including those who are English Language Learners
  - Educators are interested in acquiring additional knowledge and skills to better address the needs of ELL students

- MELL's goal is to help educators better meet the instructional needs of English Language Learners

# 2005 Mathematics TAKS Scores by Grade Level and Group



**Percentages of Students Meeting 2005 Standards on TAKS (Sum of All Grades Tested)**



# **Achievement in math and science lag behind other academic areas.**

- To address this need, TEA has launched a comprehensive math professional development initiative.
- MELL is one component of this initiative.

# MELL Partnership

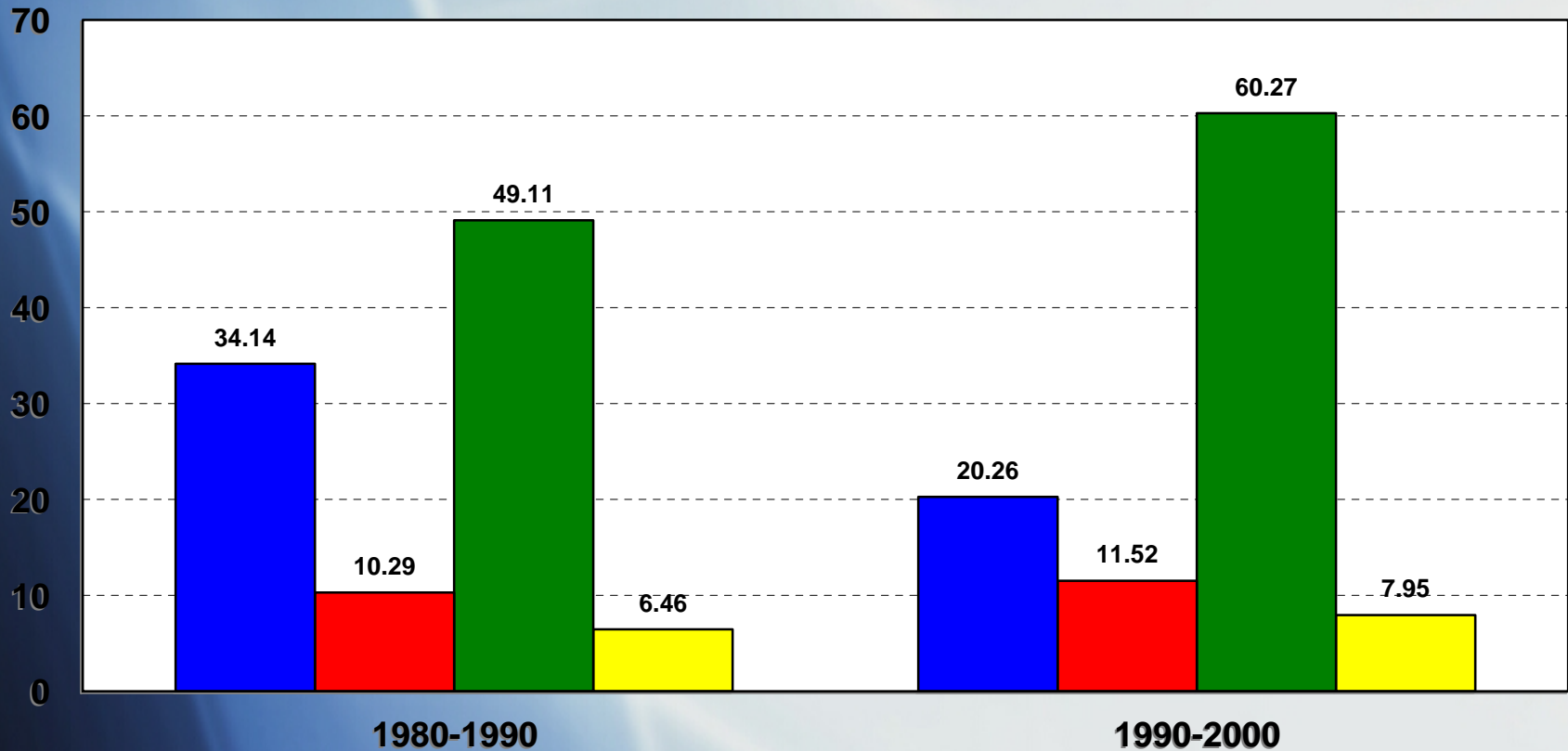
- MELL is a partnership between Texas State University System, its five member universities, and the Texas Education Agency.
- Texas State University System Universities
  - Angelo State University
  - Lamar University
  - Sam Houston State University
  - Sul Ross State University
  - Texas State University-San Marcos



# English Language Learners (ELLs)

- ELLs include all students who have a native language other than English.
- In Texas, the vast majority of ELLs are Hispanic students whose native language is Spanish.

# Proportion of Net Population Change Attributable to Each Race/Ethnicity Group in Texas for 1980-1990 and 1990-2000



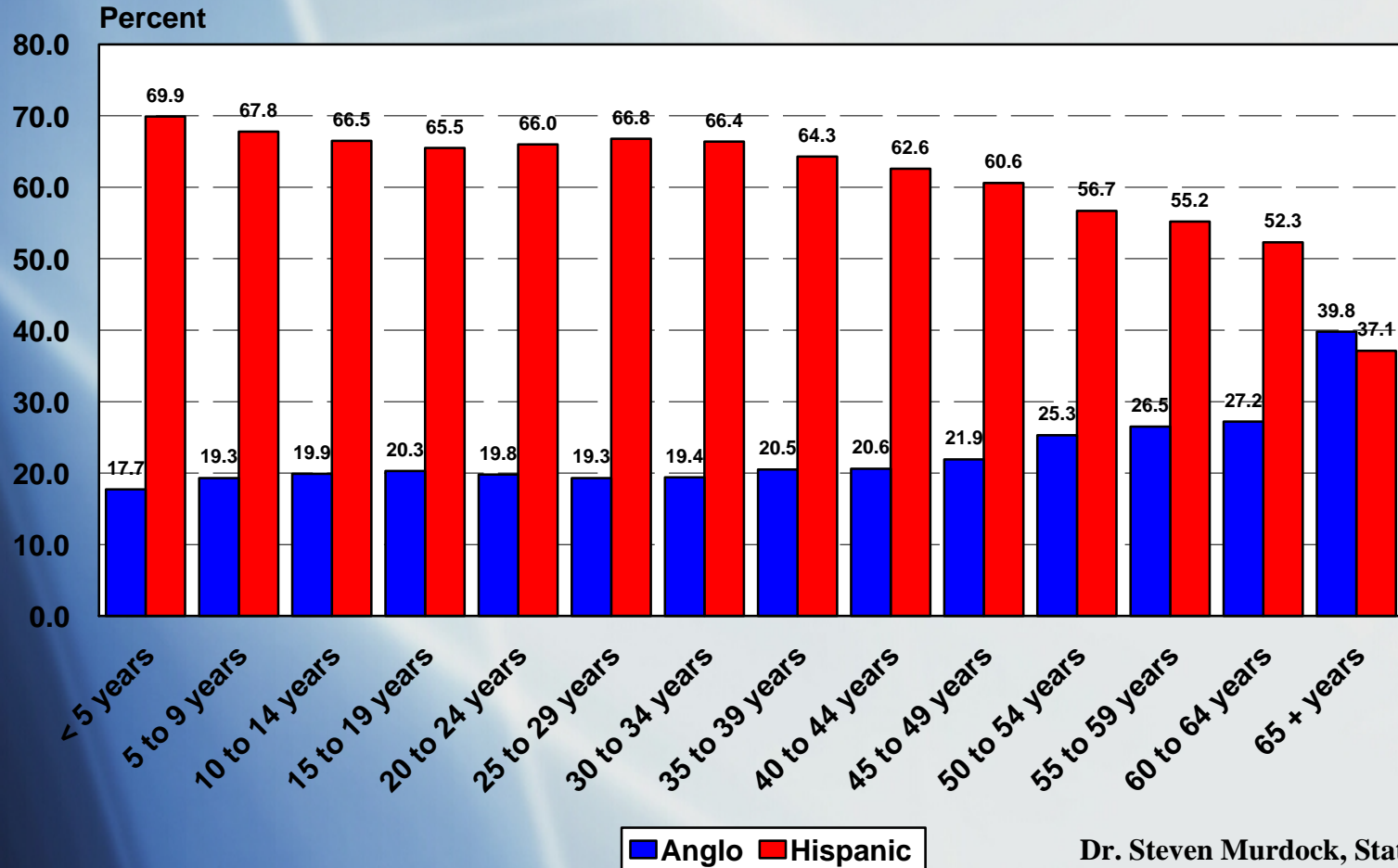
■ Anglo ■ Black ■ Hispanic ■ Other

Dr. Steven Murdock, State  
Demographer of Texas,  
<http://txsdc.utsa.edu/>

# ELL Trends

- The ELL student population is currently a significant percentage of Texas students.
  - 15.3% in 2003-2004 [IDRA Newsletter - February 2005]
- The ELL student population is expected to continue to increase in the coming years.

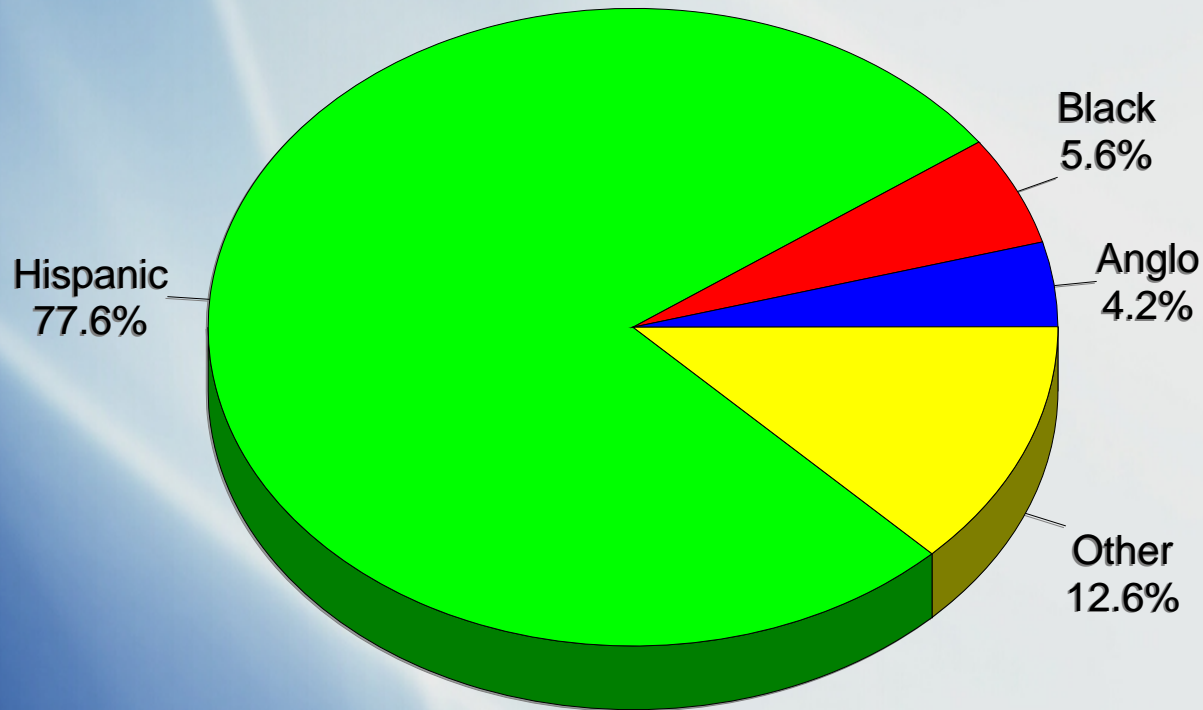
## Percent of Texas Population by Age Group and Ethnicity, 2040\*



\* Projections are shown for the 1.0 scenario

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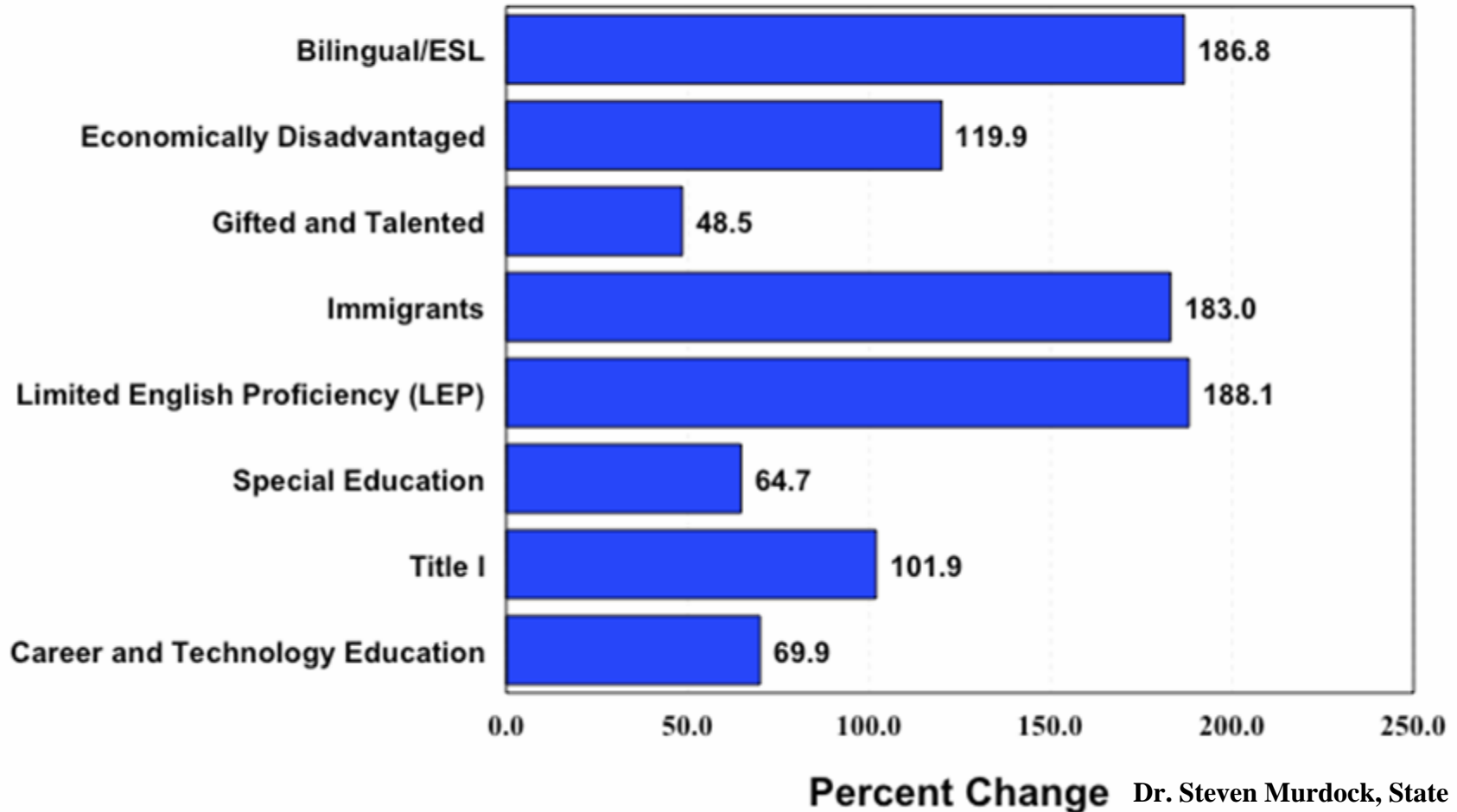
# Projected Percent of Net Change Attributable to Each Race/Ethnicity Group for 2000-2040\*



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\*Using U.S. Census count for 2000 and Texas State Data Center 1.0 population projection scenario for 2040.

# Percent Change in Enrollment in Selected Elementary and Secondary School Programs in Texas, 2000 to 2040\*



\*Projections are for the 1.0 Scenario

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<http://txsdc.utsa.edu/>

# Pressing Need

- There is a pressing educational, economic and societal need to increase math achievement of ELL students

If current population trends continue and states do not improve the education of all racial/ethnic groups, the skills of the workforce and the incomes of U.S. residents are projected to decline over the next two decades.

The National Center for Public Policy and Higher Education, November 2005 Policy Alert



# What Research Suggests About Math and English Language Learners

# Teaching Strategies for LEP Students

- Mather, J., & Chiodo, J. (1994). A mathematical problem: How do we teach mathematics to LEP elementary students?. *The Journal of Educational Issues of Language Minority Students*, 13, 1-12.
  - Stress understanding rather than rote computational procedures.
  - Provide profound exposure to manipulative, concrete, sensory, and hands-on activities, not to replace discussion, but to support it.
  - Use cooperative learning (small group activities) and minimize individual seatwork.
  - Provide opportunities for peer tutoring—preferably by another LEP or bilingual student who understands the concepts.

# Teaching Strategies for LEP Students, Continued

- Mather, J., & Chiodo, J. (1994). A mathematical problem: How do we teach mathematics to LEP elementary students?. *The Journal of Educational Issues of Language Minority Students*, 13, 1-12.
  - Include guided practice with close monitoring of students.
  - Use reinforcement, reward, and total motivational systems.
  - Emphasize multicultural referents and relevancy in lessons.
  - Use second language texts, materials, and resources as much as possible.

# Teaching Strategies for LEP Students, Continued

- Mather, J., & Chiodo, J. (1994). A mathematical problem: How do we teach mathematics to LEP elementary students?. *The Journal of Educational Issues of Language Minority Students*, 13, 1-12.
  - Use limited, simplified instruction (using caution to retain the essence of the original content and problems); limited use of pronouns and adjectives; instruction with pauses and repetition; concerted efforts to be aware of and to explain any culturally-based terms.
  - Use basic mathematics vocabulary in the second language for individualized instruction whenever possible. Note that vocabulary should not be used to focus on key words but should be used in context to develop understanding.
  - Model expected student behavior..

# Teaching Strategies for LEP Students, Continued

- Mather, J., & Chiodo, J. (1994). A mathematical problem: How do we teach mathematics to LEP elementary students?. *The Journal of Educational Issues of Language Minority Students*, 13, 1-12.
  - Be aware of how other countries and cultures teach basic mathematical concepts.
  - Use programs that are designed to increase hands-on activities and relevancy and minimize abstraction.
  - Use such methods as Direct Instruction (e.g., Active Mathematics Teaching, or Cognitively Guided Instruction

# New Insights

- Recent research is showing that academic achievement among ELLS is greatest when students receive dual language instruction.
  - Thomas, W., & Collier, V. (2003). *A national study of school effectiveness for language minority students' long-term academic achievement* (CREDE Research Brief # 10), Center for Research on Education, Diversity and Excellence.

# How is dual language different than bilingual?

- Dual Language
  - Instruction alternates between English only classes and native language only classes.
- Bilingual Education
  - A combination of two languages used throughout the day

# Language Acquisition

- A complex process influenced by many variables
- Just as first language acquisition varies substantially among children, so will second language acquisition
- Consider your own experiences in a foreign language class (some students have a natural ability while others struggle)
- Mathematics involves a specialized language and vocabulary



# Today in Texas

- Given current fiscal and human resources, statewide dual language instruction is presently not a viable option in Texas secondary schools, especially in mathematics.
- Currently our best available option is to provide teachers with professional development and instructional resources targeted at enhanced instruction for ELL students.

# Mathematics and ELLS: Different Populations

## LANGUAGE PROFICIENCY

MATH PROFICIENCY

LIMITED English  
Proficiency BUT  
MODERATE Math  
Proficiency

MODERATE English  
Proficiency &  
MODERATE Math  
Proficiency

LIMITED English  
Proficiency &  
LIMITED Math  
Proficiency

MODERATE English  
Proficiency but  
LIMITED Math  
Proficiency

# Classrooms as Greenhouses

MELL has posed this question:

“What conditions provide optimal growth for ELL students in mathematics?”

# MELL doesn't have THE answer

- But we do have a current consensus based upon:
  - review of the research
  - analysis of professional development programs
  - teacher input, and
  - prolonged professional dialogue.

# MELL Classroom Practices Framework

- Consists of six components which include enabling practices and indicators.
  - **Learning Atmosphere and Physical Environment**
  - Instructional Practices
  - Mathematics Content and Curriculum
  - Language Practices
  - Family and Community Involvement
  - Assessment of Student Learning

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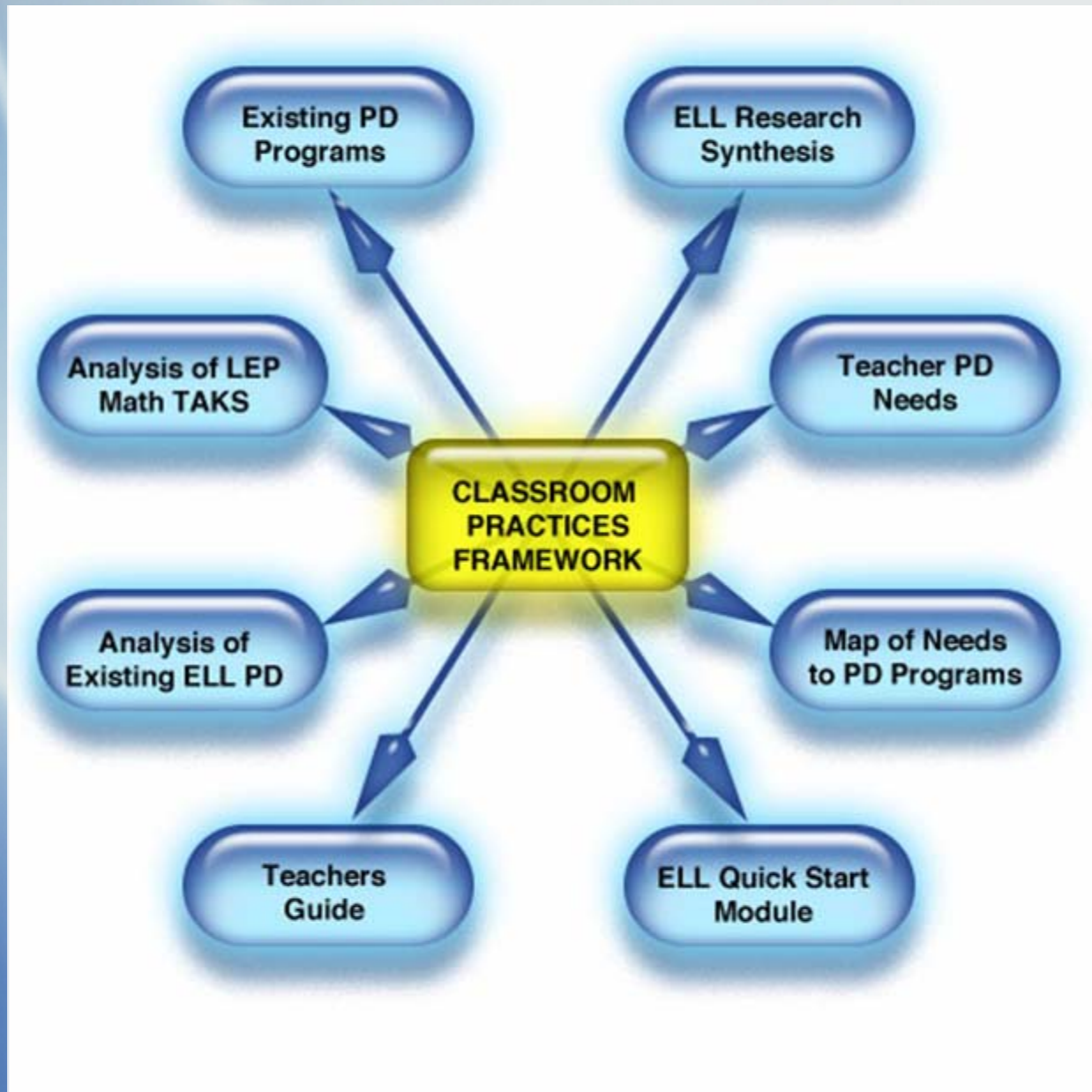
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  - **Assessment of Student Learning**

# Some Culminating Thoughts

- The good news is that the instructional practices that promote ELL success also work well for other students
- However, what is optimal for other students may, in fact, be necessary for ELLs as it appears that the success of ELL students (even more so than other students) is highly dependent upon a conducive learning environment

# MELL Products



# MELL Products

- **ELL Research Synthesis**
  - Reviews the scientifically-based research literature regarding English Language Learners (ELL) and the teaching of mathematics for secondary students (particularly 11<sup>th</sup> grade students).
- **A Summary of Mathematics Professional Development Models Used in the State of Texas**
  - Identifies and summarizes twelve models of professional development in mathematics that are used in Texas. Summaries include an overview and an analysis and the format is consistent across models to facilitate comparisons.

# MELL Products

- **An Analysis of Existing PD Models**
  - Analysis of each of the 12 identified PD models by identifying components of each that link to the six categories of the Classroom Practices Framework: 1) Learning Atmosphere & Physical Environment; 2) Instructional Practices; 3) Mathematics content & curriculum; 4) Language Practices; 5) Family & Community Involvement; and 6) Assessment of Student Learning.

# MELL Products

- **Teachers Guide**

- A guide designed for teachers to make mathematics more meaningful and understandable for the English Language Learner (ELL). The initial focus of this guide is for grades 7-11 and includes general teaching strategies that help the ELL when learning mathematics content.

# MELL Products

- **MELL Quick Start Module**
  - A professional development tool designed to explore the issues surrounding the teaching of mathematics to English Language Learners and strategies to enhance learning. The module parallels the MELL Classroom Practices Framework and consists of various professional readings, activities, and resources. [The module is offered for graduate credit through Sul Ross State University and a non-credit version is available through the MELL website ([www.tsusmell.org](http://www.tsusmell.org))].



# 2005-06 MELL Scope of Work

- Expand MELL products to encompass middle school and elementary instruction
- Critical Campus Partnerships
- Statewide Math Professional Development Collaborative

# Web Addresses

- TSUS MELL Initiative

[www.tsusmell.org](http://www.tsusmell.org)

- TSUS Education Policy Implementation Center

[www.education.txstate.edu/epic](http://www.education.txstate.edu/epic)

# Q & A Time

# For Additional Information

- MELL Contact Information:
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  - Education Policy Information Center
  - [La03@txstate.edu](mailto:La03@txstate.edu)
  - (512) 716-4532