


**Mathematics for English Language
Learners
(MELL) Summer Conference**

Creating Success for All Students

**Texas State University
San Marcos
August 1-2, 2008**





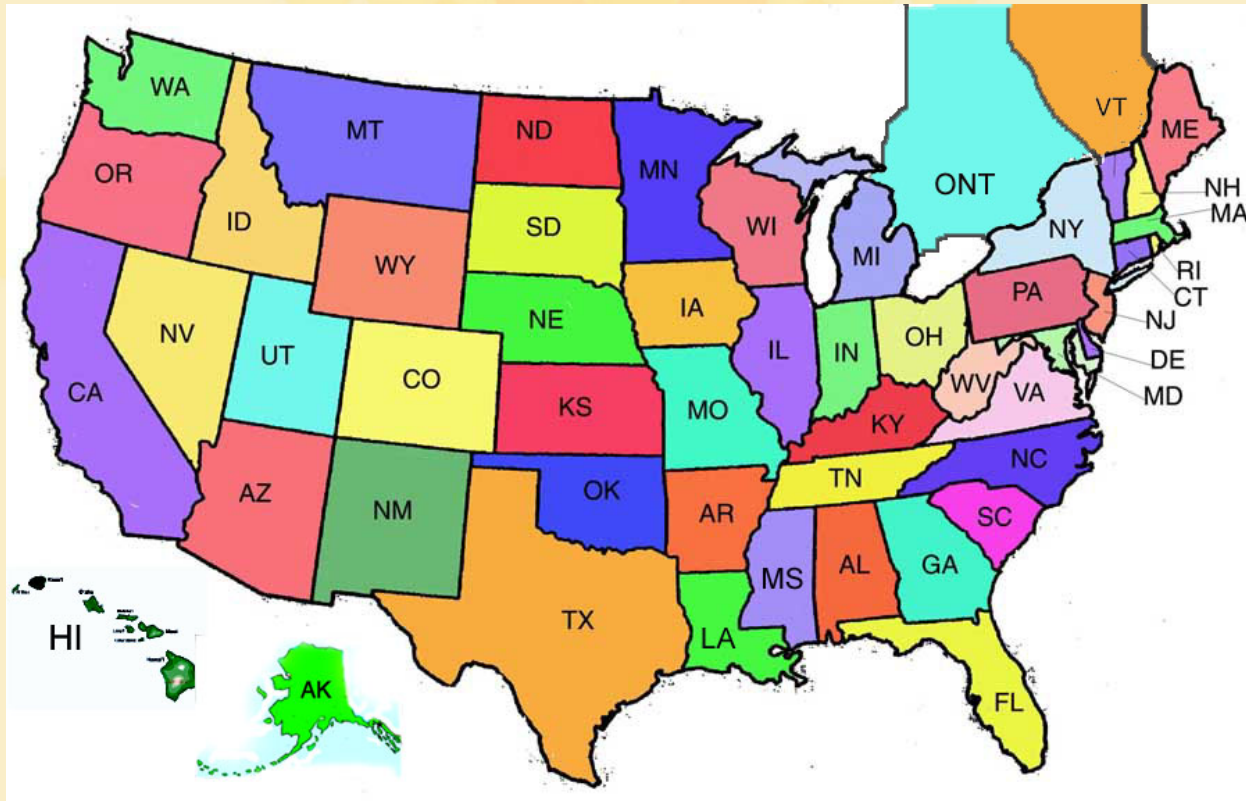
**It takes more than good
teaching!**

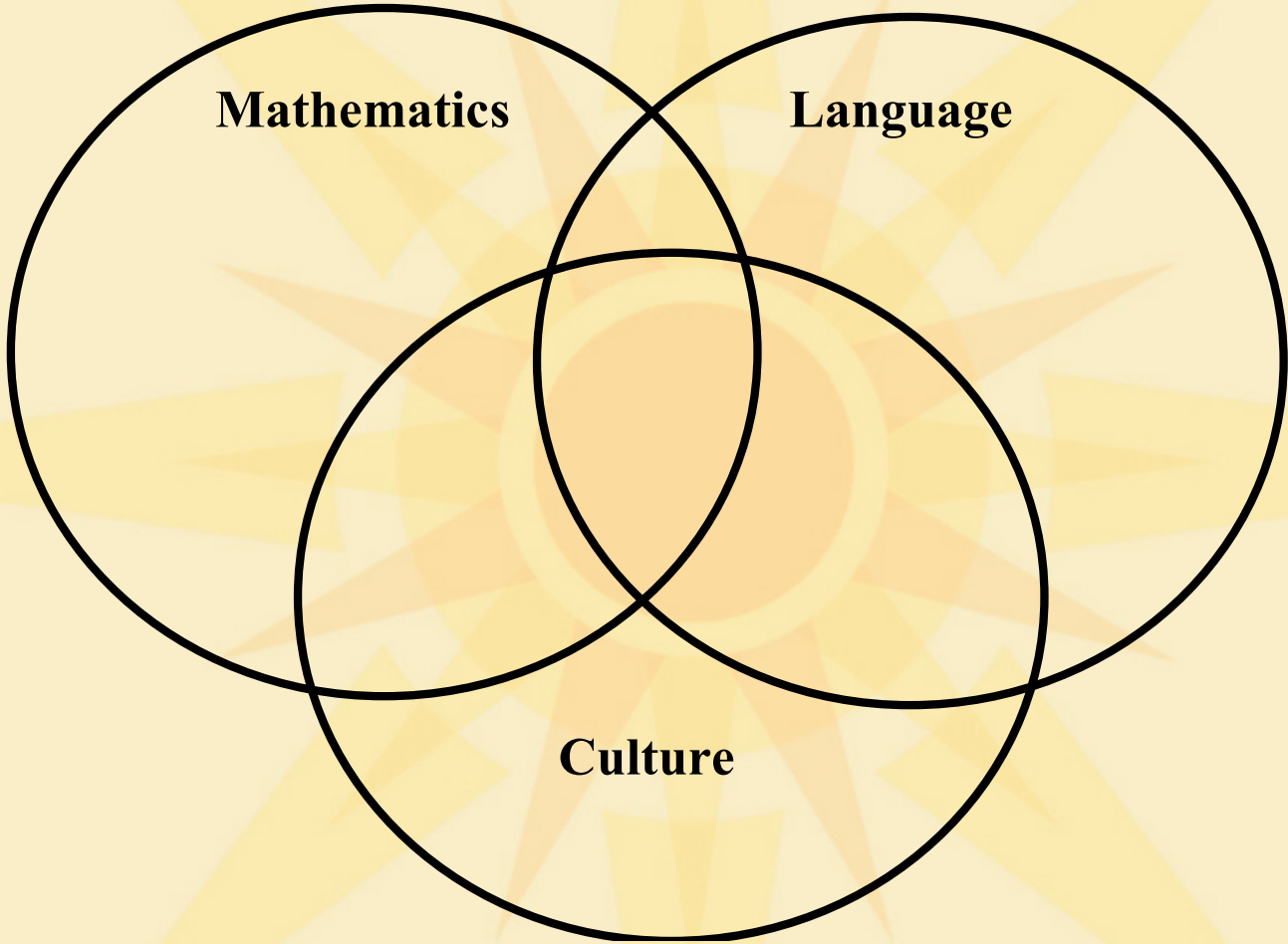
**José Franco
Director, EQUALS
Lawrence Hall of Science
University of California**

The EQUALS Mission

It is our mission to influence mathematics education so outcomes for each student are free from conditions of poverty, gender, race, culture, or language. To meet our goals, we raise awareness, provide information and resources, and collaborate and create partnerships to improve mathematics education. We have a special focus on historically underserved groups.

From Berkeley to Arkansas to Massachusetts





Mathematics

Language

Culture

Language Development

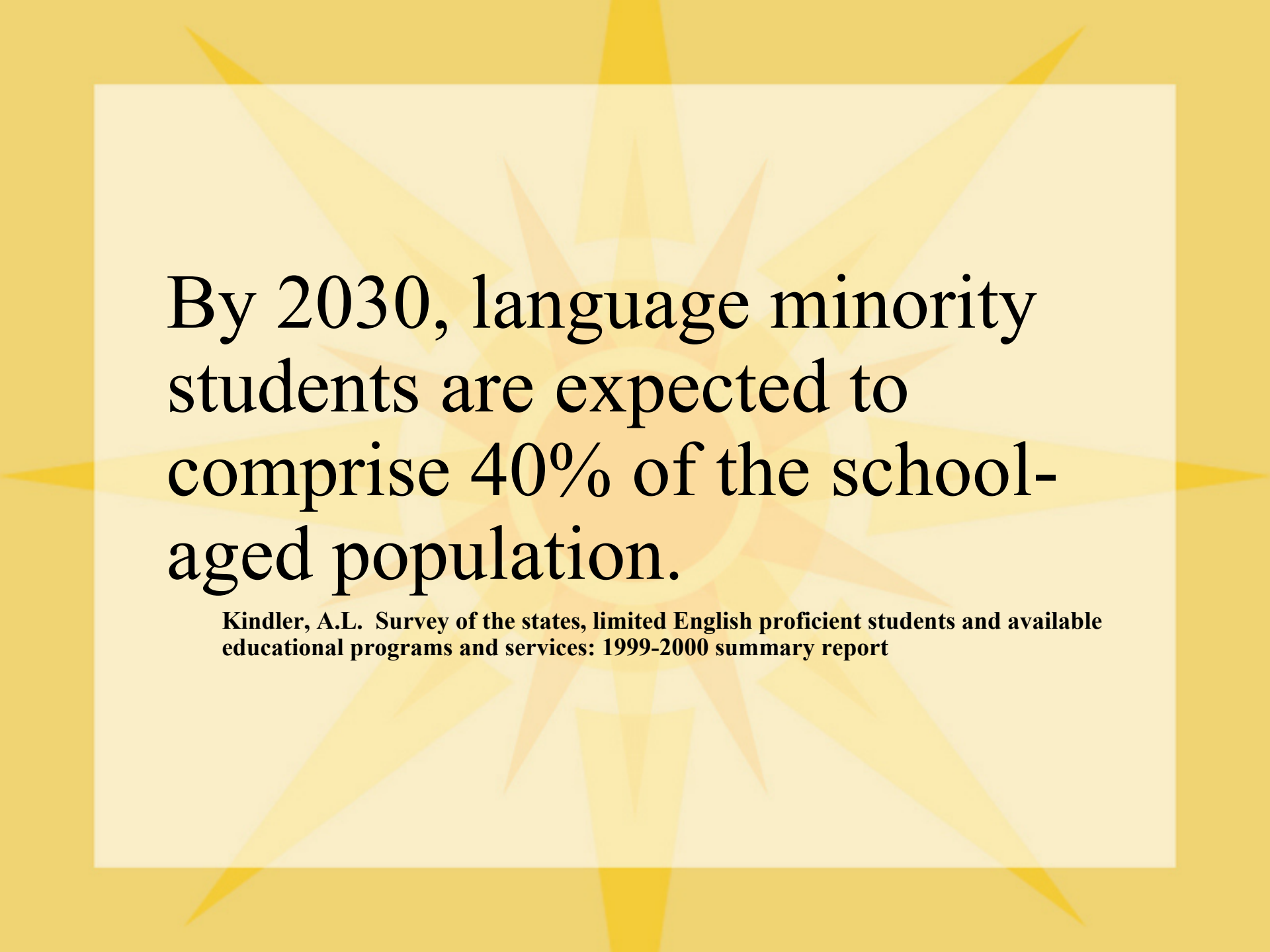
The overarching goal is to gain insight into the interplay among language development, culture, and mathematics, keeping in mind that they are all impacted by equity issues.

ELL student population (in U.S.)

Between 1979 and 2005, the number of school-age children (ages 5–17) who spoke a language other than English at home increased from 3.8 million to 10.6 million, or from 9 to 20 percent of the population in this age range.

U.S. Department of Education, National Center for Education Statistics. (2007).

The Condition of Education 2007 (NCES 2007-064). Washington, DC: U.S. Government Printing Office.



By 2030, language minority students are expected to comprise 40% of the school-aged population.

Kindler, A.L. Survey of the states, limited English proficient students and available educational programs and services: 1999-2000 summary report

NCES 1999-2000 Schools and Staffing Survey

- Out of the estimated 2,984,781 public school teachers, 41.2% teach English language learners.
- 12.5% of teachers have received eight or more hours of related training.

National Center for Educational Statistics 1999-2000 Schools and Staffing Survey

Classroom Snapshot

- Picture a classroom that you taught or visited recently where you had language minority students.



Startling Statements

- In 2003, 65% of students who come from households where English is the primary language had parents who expected them to finish college.
- The percentage for Latino/Hispanic students is 72%.

Parent and Family Involvement in Education Survey of the National Household Education Surveys Program survey of 28,183,000 students in grades 6-12, 2003.

Startling Statements

- 32% of students think they would do better in school if their teachers pushed them harder.
- The percentage for Latino/Hispanic students is 47%.

Parent and Family Involvement in Education Survey of the National Household Education Surveys Program survey of 28,183,000 students in grades 6-12, 2003.



Isn't English a Trip?

Debriefing Questions

- What language issues does the poem address?
- How would you describe this student?
- What experiences have you had with English language learners (ELLs) in your classrooms?
- In what ways have you actively supported ELLs in their learning?

Imagine

What if we could ensure student results which demonstrated high levels of academic achievement and English language development, and as a bonus, students achieved high levels of proficiency in another language.




How can we make this happen?

**It takes more than good
teaching!**

- **Talk is critical. It becomes a political tool that either empowers students or disenfranchises them.**

Dr. Lena Licón Khisty, 1995

- 
- **Academic language in mathematics goes beyond talk and vocabulary development.**

Academic English

- More extensive use of reading and writing
- Accurate use of grammar and vocabulary is critical
- Persuading, arguing, and hypothesizing are important
- Cognitively demanding and must be learned without contextual clues
- Mastery of extensive range of linguistic features

Drs. Scarcella & Rumberger, 2000

Apprehensions about vocabulary

- Long tradition of science and math as memorization of new words—high school biology texts have 45-50% more new words that are presented in a semester of foreign language.

Drs. Armstrong and Collier, 1990

- Words are taught as an end unto themselves rather than as labels for new conceptual understandings

Vocabulary Strategies

1. Word Map Strategy
2. Dual Meaning Word Strategy
3. Cognate Strategy
4. List-Group-Label Strategy
5. Feature Analysis Strategy
6. Everyday-Science/Math Word Strategy

Words with dual meanings

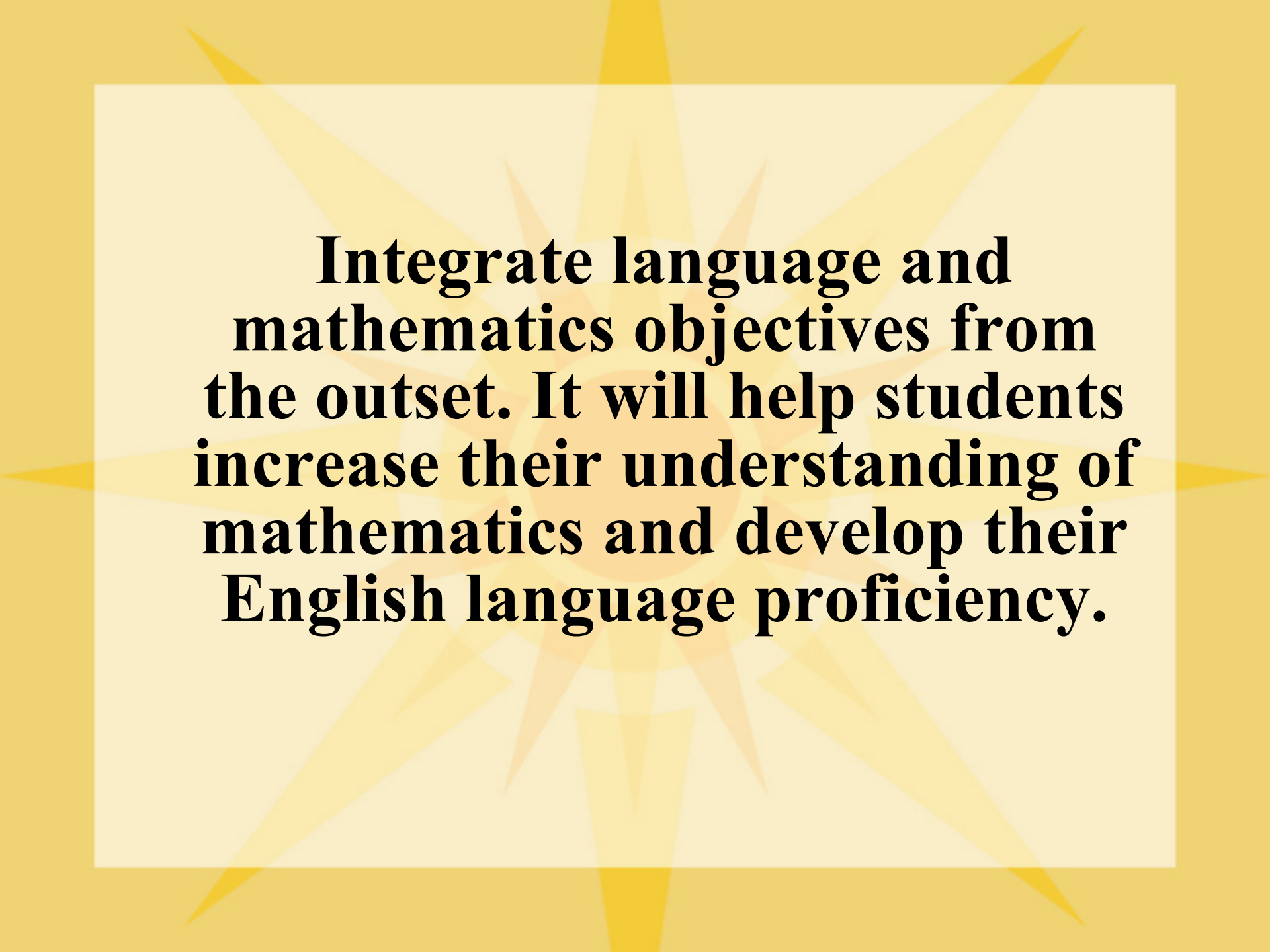
The scientist needs to **stir** the **solution** after **adding mold** and **bark**. Then **test** to see if there is a **gas...** and **test** to see if the **material sticks**.

Dual-Meaning Word Chart

Science Word	Meaning 1	Meaning 2
<i>Current</i>	Happening right now	River of water flowing through the ocean
<i>Wave</i>	to move hand side to side to say hello	Water moving across the ocean
<i>Property</i>	To possess something	Something you can see, feel, hear, smell or taste about an object
<i>Table</i>	Place where people sit to eat	Arrangement of information in columns & rows

It takes more than good teaching!

There are instructional techniques and lesson formats that deliver mathematics content to language minority students more effectively.

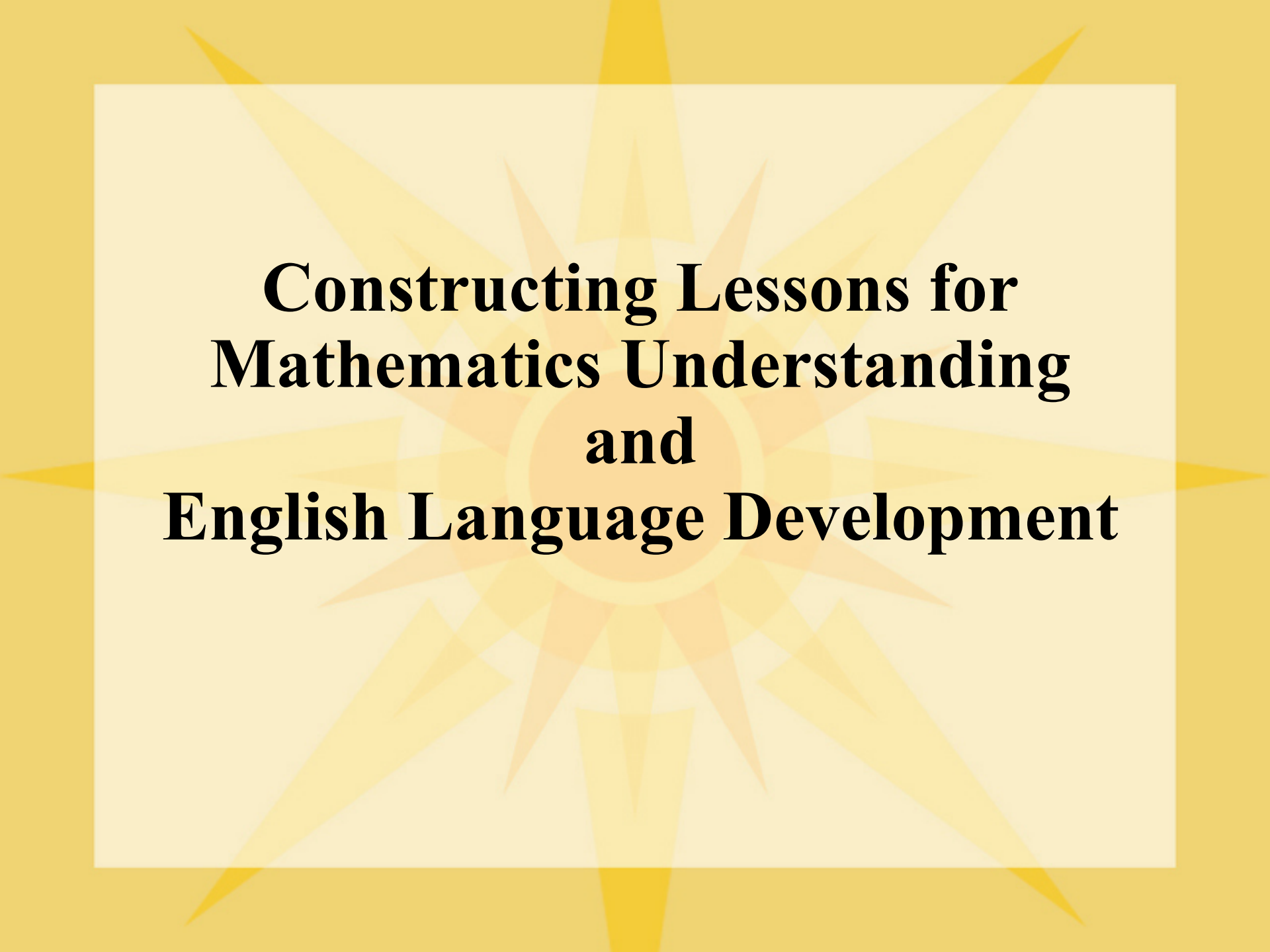


Integrate language and mathematics objectives from the outset. It will help students increase their understanding of mathematics and develop their English language proficiency.

**Constructing Lessons for English Language Development
and Mathematics Understanding Protocol
Ordered Pairs in the Coordinate Plane**

Organizing a lesson is a complex process, yet adding another dimension in learning need not diminish the content focus. This protocol serves as a map to help you think about your objectives in mathematics and language. Maintain a rigorous mathematics goal. Keep ELD objectives specific and consider the various levels of fluency of the students in your class.

Mathematics Objectives	English Language Development Objectives
<p>• What mathematics content is addressed in this lesson? Students will identify and graph ordered pairs in the four quadrants of the coordinate plane.</p> <p>• What strategies will I use to address the mathematics content? <i>Connect content to prior knowledge</i> : Ask students to discuss what they remember about the coordinate plane. <i>Vocabulary review</i>: Reminds students of how the following labels apply to the graph: <i>axis, origin, negative, positive, quadrant</i> <i>Modeling</i> : With a partner, model to the class. Walk on the grid beginning with x and provide a clue for y. <i>Practice</i> : In pairs, have students walk on the grid with an assigned series of points. <i>Debrief the lesson</i> : Have students discuss what they learned and understand from the lesson.</p> <p>• What Content Language can/should I expect my students to use? Axis, origin, negative, positive, graph, quadrant</p> <p>• Assessment: What questions/prompts can I ask to assess my students' understanding of the content? <i>Student Self Assessment</i>: What do you know about the points on a grid? <i>Peer Assessment</i>: Provide the students in another group feedback on their report or paper. <i>Written</i> : Write about what you notice is common or different about the graphs. <i>Oral</i> : Interview a student with the following speaking prompt: Three things you observe on your graph are _____. <i>Demonstration</i> : Ask the student to demonstrate that she can identify the various parts of the graph; including axis, origin, quadrant, etc.</p>	<p>□ What is the language objective of this lesson? Students will use academic and content language to describe their moves on the Algebra Walk grid.</p> <p>• Which language process(es) will this lesson target? <i>Listening</i> : Students will listen to the rules for moving on the grid <i>Speaking</i> : Students will describe what they see and/or state the rule for each move Possible Speaking Prompts: N I moved to point (1,2) N I took three moves to get to point (5,10). <i>Writing/Illustration</i>: Each group of students writes three true statements (on sentence strips) that describe the group's moves on the coordinate grid. <i>Reading</i> : Each group presents and justifies their public notes to the other students.</p> <p>• What Academic Language can/should I expect my students to use? Describe, compare, identify, create</p> <p>• Assessment: What questions/prompts can I ask students at the various fluency levels? L1: Point to (__,__) on the grid (after modeling) L2: Do you agree or disagree with what the previous student said? L3: Give directions to another student so that he can arrive at point (-4,6). L4 Describe the line or pattern of your set of points. L5 Compare the similarities between Group A and Group B's points/lines.</p>



**Constructing Lessons for
Mathematics Understanding
and
English Language Development**

Mathematics Objectives

- **What mathematics content is addressed in this lesson?**
- **What strategies will I use to address the mathematics content?**
- **What content language can and should I expect my students to use?**
- **What questions and prompts can I ask to assess my students' understanding of the content?**

English Language Development Objectives

- **What is the language objective of this lesson?**
- **Which language process(es) will this lesson target?**
- **What academic language can and should I expect my students to use?**
- **What questions and prompts can I ask students at the various fluency levels?**

Three Truths about English Language Learners

1. English language learners are not deaf! Therefore talking louder to them is not an effective teaching strategy.

Instead...

- Assess the prior knowledge that the students have about the content.

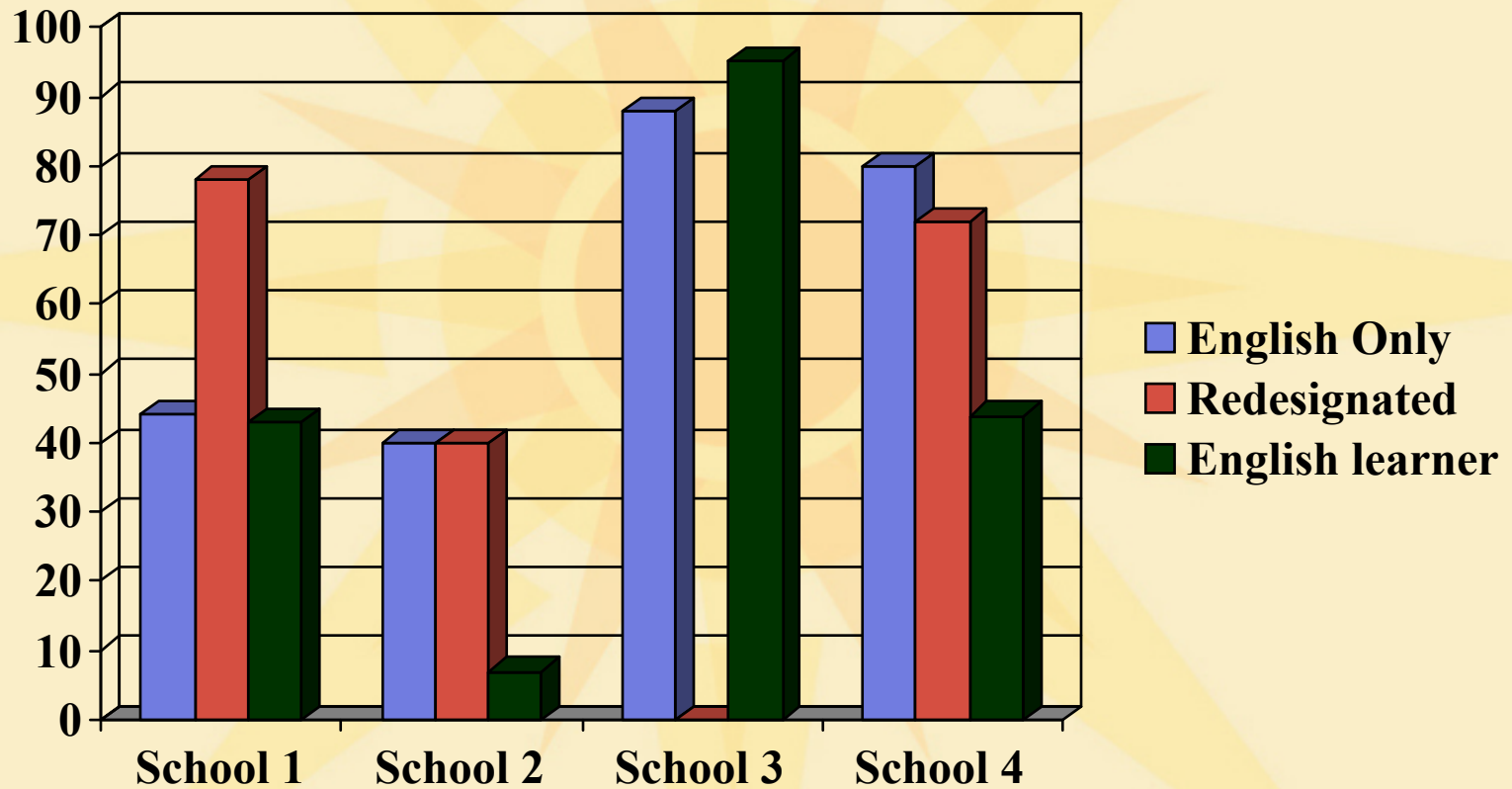
Dr. Francisca Sanchez, Associate Superintendent San Francisco Unified School District

- Create a language-rich environment for students. Mathematics teachers are also language teachers.

2. If a student does not speak English, it does not mean he/she doesn't understand mathematics.

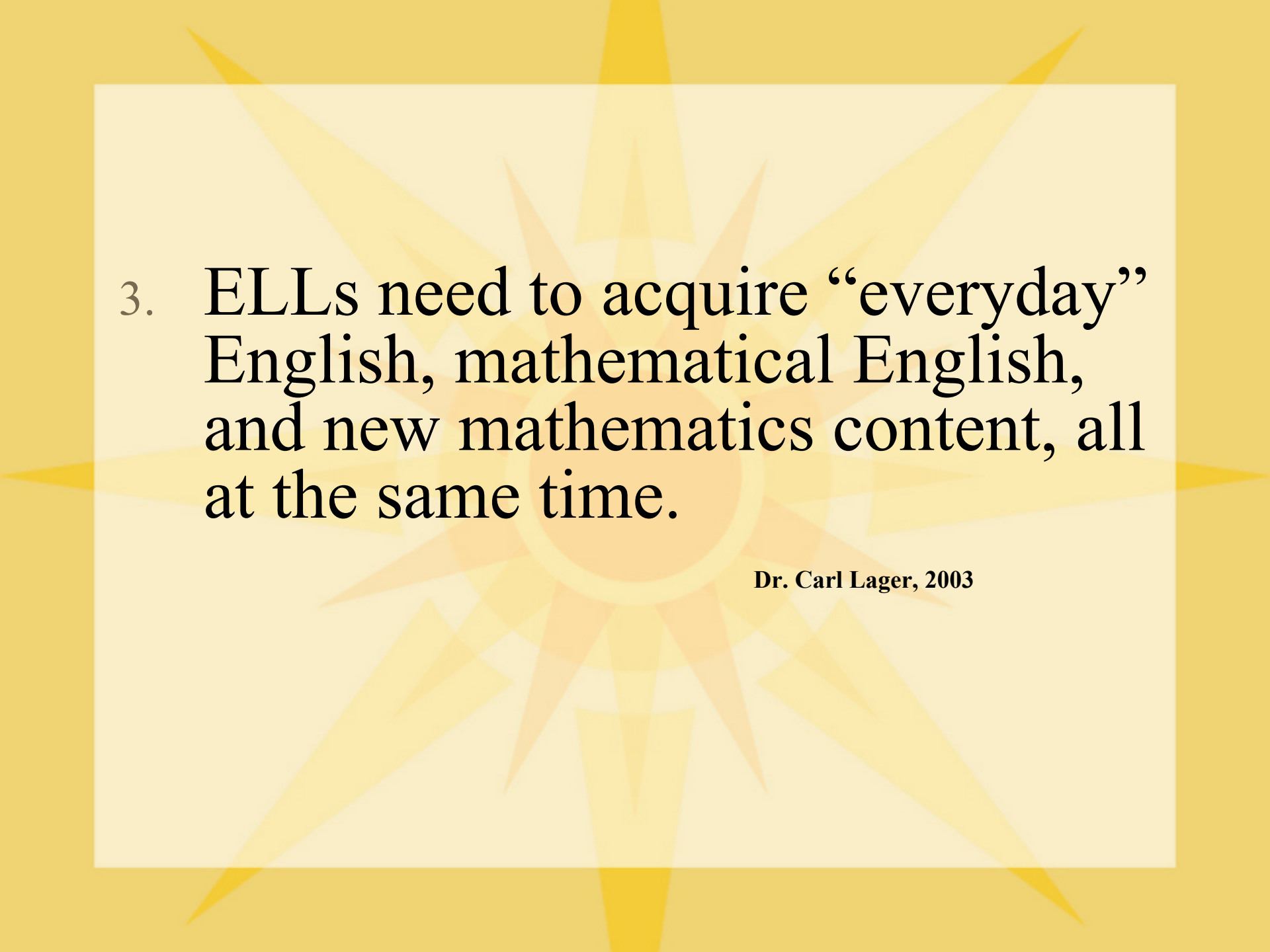
Unfortunately, it appears that schools' curricular decisions can impact ELLs college eligibility.

Percent of 2002 Graduates Who Enrolled in 8th or 9th grade Algebra



“For me, they shouldn’t have put me in basic math. I should have been in algebra. But there is more English vocabulary in algebra, so they said I couldn’t take it until I learned more English. I felt I was spending time with things I already knew, but then that’s required of Latin immigrants...”

11th grade Mexican student, immigrated at age 14.


- 
3. ELLs need to acquire “everyday” English, mathematical English, and new mathematics content, all at the same time.

Dr. Carl Lager, 2003

Language minority students differ in the

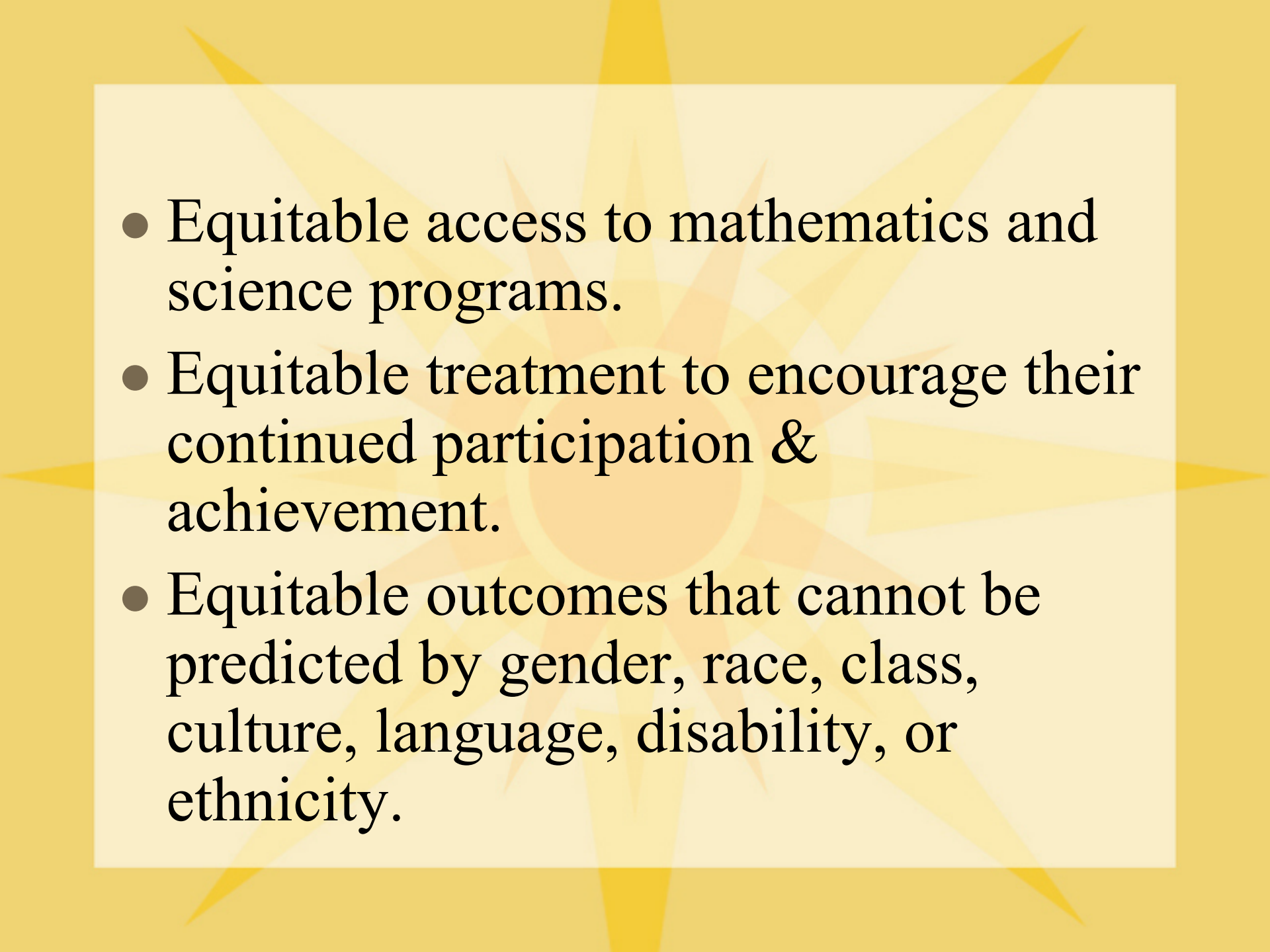
- languages that they speak
- fluency in English
- cultures that they come from
- social status that they hold
- type of prior schooling they have had

Laurie Olsen, California Tomorrow 2006



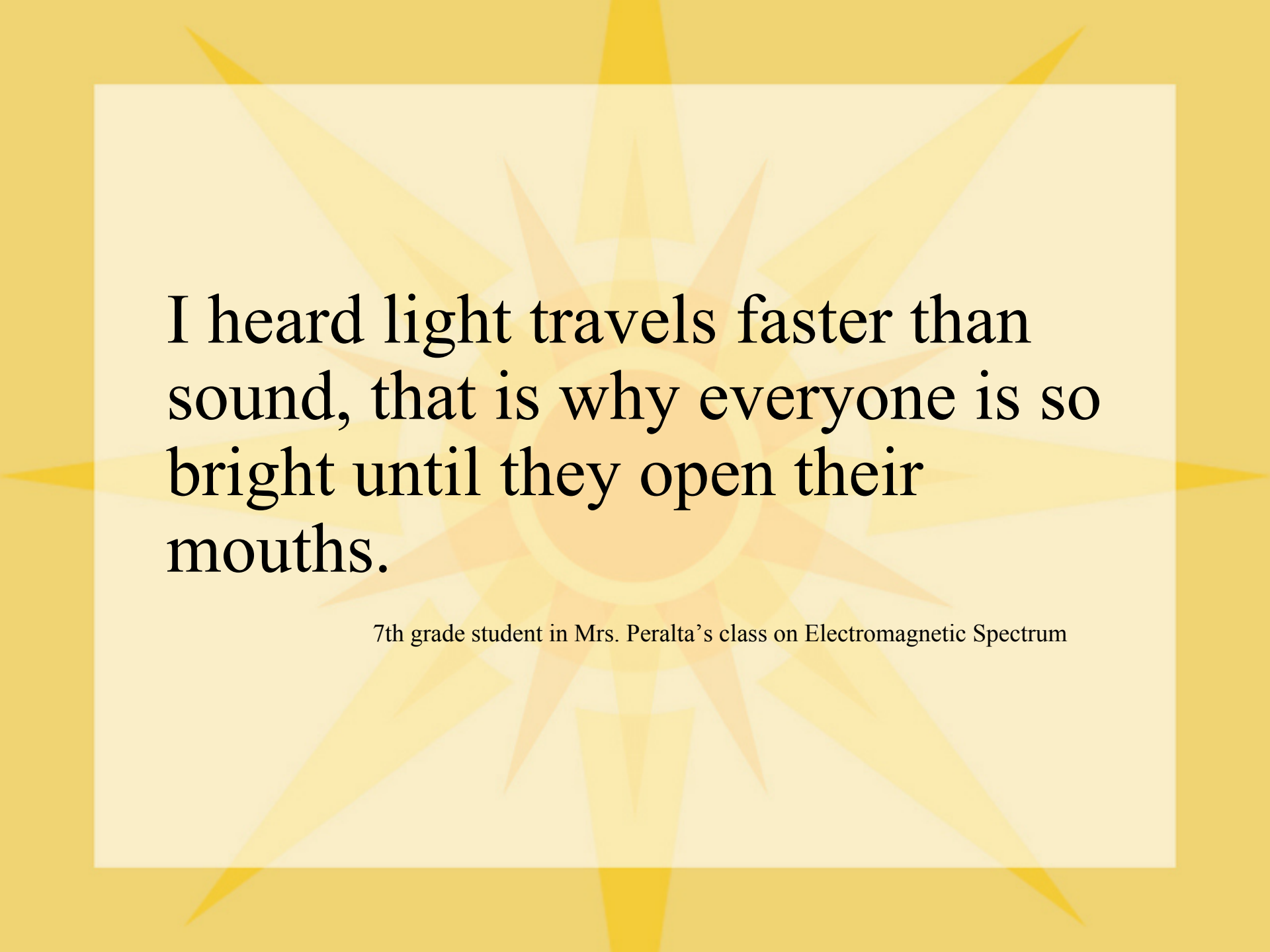
**Equity means fairness,
Equality means sameness.**

Nancy Kreinberg, 1997

- 
- Equitable access to mathematics and science programs.
 - Equitable treatment to encourage their continued participation & achievement.
 - Equitable outcomes that cannot be predicted by gender, race, class, culture, language, disability, or ethnicity.

**The mission of TODOS:
Mathematics For ALL
is to advocate for an equitable and
high quality mathematics education
for all students, in particular
Latino/Hispanic students, by
advancing the professional growth
and equity awareness of educators.**

www.todos-math.org



I heard light travels faster than sound, that is why everyone is so bright until they open their mouths.

7th grade student in Mrs. Peralta's class on Electromagnetic Spectrum

José Franco

EQUALS

Lawrence Hall of Science

University of California

Berkeley, California 94720-5200

jfranco@berkeley.edu

www.lawrencehallofscience.org/equals

510.643.6521