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SCHOOL MATHEMATICS PROJECT

# PROGRAM FOR K-12 MATHEMATICS TEACHERS

Texas Higher Education Coordinating Board  
TEACHER QUALITY GRANT

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# Culture in the Classroom

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## Overview

- What is “culture”?
- What does “culture” have to do with learning and teaching?
- What can you do to better address “culture” in your classroom?



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What is “culture”?



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Culture is a way of life.

Williams, Raymond. (1989). Culture is ordinary. In Robin Gable (Ed.),  
*Resources of hope: Culture, democracy, socialism*, (pp. 3-14). London: Verso.



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Culture is that composite of socially and historically determined behaviors that nourishes and thereby defines the spiritual, religious, intellectual, socio-political, and economic parameters within which the individual develops and exists.

Akoto, K. A. (1992). *Nationbuilding theory and practice in Afrikan centered education*. Washington DC: Pan Afrikan World Institute.

Geertz, C. (1973). Person, time, and conduct in Bali. In C. Geertz (Ed.), *Interpretation of cultures*, 360-411. New York: Basic Books.



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Culture is understood to be the  
context within which people live their  
lives.

Geertz, 1973.



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There are no culture-free or values-free human endeavors.

Akoto, 1992.





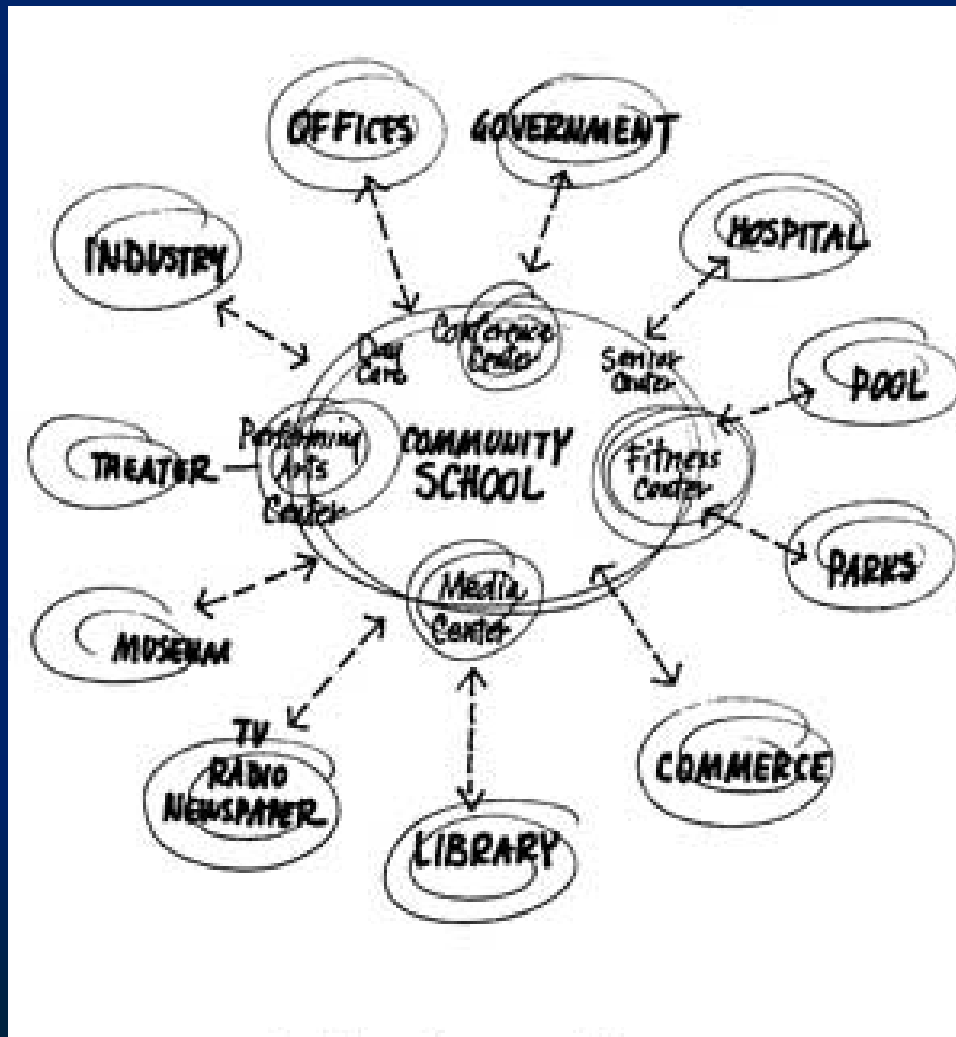
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Culture is the arrangement of  
meanings entrenched in symbolic  
representations.

Geertz, 1973.



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Cultural imperatives determine . . .  
the tools and strategies used to  
conceptualize curricula, deliver curricula,  
and assess student-learning of curricula

e.g., Allen & Boykin, 1992; American Psychological Association, 2003;  
Boykin et al., 2005; Dumont, 1972; Gutierrez & Rogoff, 2003; Hale, 1994;  
Hollins, 1996; Labov, 1966, 1970, 1972; Lee et al., 2003; Tyler et al., 2005



## Cultural imperatives determine . . .

- the tools and strategies used to promote understanding of course content, make connections between concepts and applications, and conceptually integrate class materials



## Cultural imperatives determine . . .

- the tools and strategies used to communicate reasoning and master testing strategies
- the instruments used to assess students' academic achievement



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# Culture, Learning, and Teaching

Culture is the integrated pattern of human behavior that is both a result of and integral to the human capacity for learning and transmitting knowledge to succeeding generations.

Merriam-Webster Encyclopedia, m-w.com. Retrieved May 13, 2012 at:  
<http://www.merriam-webster.com/concise/culture>



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The racial/ethnic difference in educational achievement in the United States is attributable to the similarity or difference between students' culture and the schooling practices they are expected to engage and to master, which often are derived from European American culture.

e.g., Allen & Boykin, 1992; American Psychological Association, 2003; Au, 1980, Au & Mason, 1981; Boykin, et al, 2005; Hollins, 1996; Lee, et al., 2003; Loewen, 2007; Michaels, 1981; Tyler, et al, 2005.



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## SCP Participants' Cultural Diversity

Race/Ethnicity	Number of Teachers	Country of Ancestry/Origin	Number of Teachers
Asian	7	China	1
African American	37	Columbia	1
Hispanic	18	Dominican Republic	1
White	27	El Salvador	1
No Response	2	Ghana	1
		Honduras	1
		Italy	1
		Mexico	10
		Pakistan	1
		Philippines	1
		Syria	1
		U.K.	1
		USA	58
		Vietnam	1

**Cultural Worldview: A matter of PERSPECTIVE**





# Cognitive Psychology

“Learning takes place by assimilation of new concepts and propositions into existing concepts and propositional frameworks held by the learner. This knowledge structure as held by the learner is also referred to as the individual’s cognitive structure.”

Novak, J. D. & A. J. Cañas (2008). *The Theory Underlying Concept Maps and How to Construct Them*, Technical Report IHMC CmapTools 2006-01 Rev 01-2008, Florida Institute for Human and Machine Cognition, p.2. Retrieved from:  
<http://cmap.ihmc.us/Publications/ResearchPapers/TheoryUnderlyingConceptMas.pdf>.



# Meaningful Reception Learning

- Conceptually clear material, presented with language and examples relatable to the learner's prior knowledge
- Learner must possess relevant prior knowledge
- Learner must choose to learn meaningfully

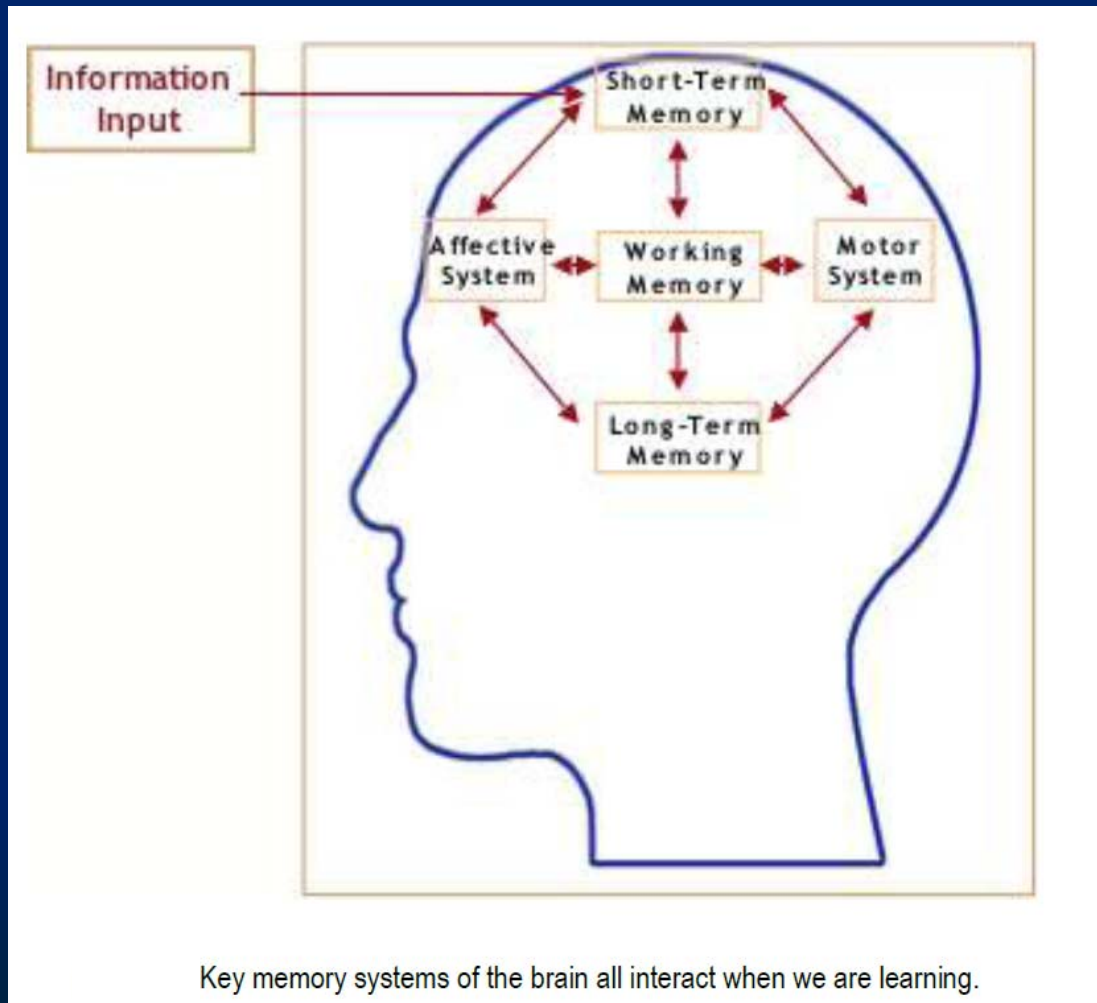


# Human Memory

- A complex set of interrelated memory systems
- Not simply a vessel to be filled



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Key memory systems of the brain all interact when we are learning.

Novak & Cañas, 2008.



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# Cultural Difference/ Individual Difference . . .

in the quantity and quality of relevant  
knowledge possessed by the learner



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# Cultural Difference/ Individual Difference . . .

in the motivation to try to incorporate  
new knowledge into related knowledge  
already possessed by the learner



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Discrepancies in students' academic achievement parallel discrepancies in opportunities experienced everyday by students of different cultural backgrounds.

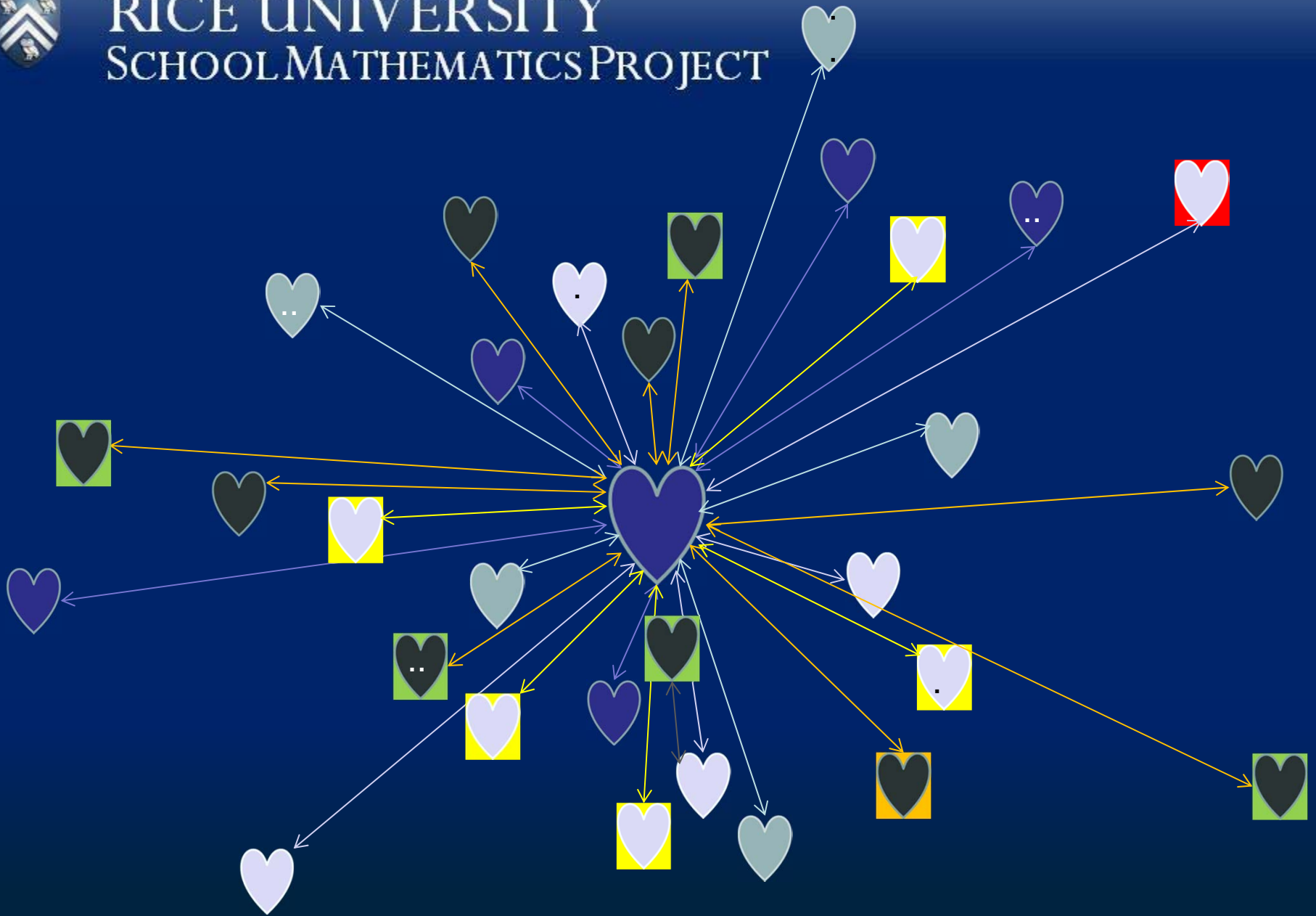
Gutiérrez, R. (2008). A gap-gazing fetish in mathematics education? Problematizing research on the achievement gap. The National Council of Teachers of Mathematics, Inc. Retrieved from <http://www.nctm.org/>, March 8, 2010.







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*“ You are either a part of the  
**SOLUTION**  
or you’re a part of the  
**PROBLEM.”***

Writer and activist , Eldridge Cleaver, 1968.



# Culturally Proficient Instruction

- Culture is a powerful, predominant force.
- There is cultural diversity within cultural groups.
- People have group as well as personal identities.
- The dominant culture serves different people in different ways.
- The unique needs of every culture must be respected.

Robins, K. N., Lindsey, R. B., Lindsey, D. B., & Terrell, R. D. (2006). *Culturally Proficient Instruction: A Guide for People Who Teach* (2nd ed.). Thousand Oaks, CA: Corwin Press.



# Colorblindness

Often functions to the detriment of students of color because it adheres to the larger social message, that race/ethnicity no longer has a role in American society.

Therefore, individuals are not held accountable to address their views toward people of color or how those views affect their interactions.

Schofield, J.W. (1986). Causes and consequences of the colorblind perspective. In *Prejudice, discrimination, and racism*, 231-253. London: Academic.



# Equality

- Identical instruction
- All students have equal access to high quality teachers, instruction and educational resources



## Equity

- Includes teachers' awareness of the historical impact of social stratifications on students' academic success
- Ensures that reasonable and appropriate accommodations are made to promote access and attainment for all students



# Reform Mathematics

All students should receive instructional support to:

- 1) value mathematics,
- 2) be confident in their ability to do mathematics,
- 3) become mathematical problem solvers,
- 4) learn to reason mathematically, and
- 5) learn to communicate mathematically.

National Council of Teachers of Mathematics (1989). *Curriculum and evaluation standards for school mathematics*. Reston, VA: NCTM.



# How do children learn mathematics?

## **Lev Vygotsky & Albert Bandura**

Mathematics learning is a social experience..

## **Jerome Bruner**

Mathematics instruction should have students learning what professionals know and doing what professionals do.

## **Jean Piaget**

Learning activities should be aligned with students at various levels of cognitive development.





## Why bother?

- Focuses students' attention on mathematical ideas and sense making rather than on following the teachers' directions
- Develops the belief in students that they are capable of doing mathematics and that mathematics makes sense



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- Provides ongoing (formative) assessment data to inform instructional decisions, to inform students and to help them to succeed, and to provide parents with information to support students' learning
- Makes learning mathematics a lot of fun



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# How is mathematics learning best assessed?

### **Mathematical Sciences Education Board**

If students are to be encouraged to investigate, explore and discover, assessment must measure student thinking and not “mimicry mathematics.”

### **National Council of Teachers of Mathematics**

Authentic assessments focus on the processes and products of students’ mathematical thinking.

### **Stiggins and Popham**

Assessments for learning provides accessible and diagnostic, ongoing information to develop strategies to empower students in mastering knowledge and skills.



## Type-1 Teachers (Traditional)

- Support school curricula that preserve the language, knowledge, and values historically taught in the U.S.
- Believe students are different but do not think it is necessary to use different teaching strategies.
- Require students to work independently on assignments.
- Believe the cultural needs of students are not a teacher's responsibility.
- Believe the primary focus of classroom instruction should be preparing students for acceptance into American society.



## Type-2 Teachers (Multicultural)

- Believe many students fail because the environment is inflexible.
- Believe students' differences in cultures and learning styles may require different instructional materials and strategies.
- Believe that if teachers did not use students' cultures to help them learn, some students' needs would be left-out in the learning environment.
- Relate students' cultures to the subject matter.
- Embrace the teacher's responsibility to find and use what works with different students.



## Type-3 Teachers (Pluriversal)

- Believe education should empower students in knowledge, skills, and values for determining their social responsibilities.
- Believe meaningful school learning links with the cultural knowledge and skills that students already possess.
- Believe students have the right to be taught using strategies that use the cultural information they possess.
- Believe that collaboration among students is crucial in a good learning environment.
- Expect education to bring about an equal society for all racial and ethnic groups.





## NCSM - Recommended Activities

- 1) Create a results-driven culture that examines and addresses disparities in identity, power, and achievement, and addresses access to and within the mathematics curriculum.
- 2) Provide opportunities for teachers to collaborate with and learn from those with expertise about the needs of students from all groups.

National Council of Supervisors of Mathematics (2008). "Improving Student Achievement by leading the Pursuit of a Vision for Equity," Improving Student Achievement Series, No3. [www.ncsmonline.org](http://www.ncsmonline.org).





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- 3) Develop and implement interventions and differentiated opportunities for students that are proactive, focused on specific individual needs, and supportive of grade appropriate coursework.
- 4) Develop and implement relevant, challenging, and contextually appropriate curriculum and pedagogical skills to inspire, motivate, and respect all students' cultures and languages.



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- 5) Build a climate of high expectations and deep belief in the capabilities of each student.
- 6) Eliminate policies and practices that lock students into levels of mathematics study that limit access to collegiate study or careers that depend on mathematics knowledge.
- 7) Develop and implement assessments for and of learning that enable all teachers and learners to measure and monitor progress towards proficiency.



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- *'MLI gave me a new outlook on diversity and its true meaning.*
- *I realized that diversity refers to many things like gender, religion, age, special education, leaning ability, socioeconomic status, and many other things that make a person distinct.*
- *MLI taught me that all students are diverse in their own way. We cannot teach them unless we acknowledge their differences, accept them, and work with their differences to reach the final goal...which is to teach them.'*

RUSMP Mathematics Leadership Institute (MLI), Anonymous Lead Teacher