

The background features a series of concentric circles in light gray, some solid and some dashed, creating a ripple effect. A large, solid red speech bubble is centered on the page, pointing downwards. The title text is white and located inside the upper part of the speech bubble.

# Developing Prospective Teachers' Culturally Relevant Pedagogy in Mathematics and Beyond

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What is Culturally  
Relevant  
Pedagogy (CRP)?

**A pedagogy that empowers  
students intellectually, socially,  
emotionally, and politically by  
using cultural referents to impart  
knowledge, skills, and attitudes**

**Gloria Ladson-Billings 2009**

A theory of  
culturally relevant  
pedagogy would  
do three things:

1. produce students who can achieve academically,
2. produce students who demonstrate cultural competence,
3. develop students who can both understand and critique the existing social order.

(Ladson-Billings, 1995, p. 474)

## Origins of the term

- **Ladson-Billings (1995) studied cases of successful teachers of African American students**
- **3 broad propositions about their commonalities:**
  - The conceptions of self and others held by culturally relevant teachers
  - The manner in which social relations are structured by culturally relevant teachers
  - The conceptions of knowledge held by culturally relevant teachers

## Towards a Theory of CRP (Ladson-Billings, 1995)

- **Conceptions of Self and Others**

- Believed all students capable of success, pedagogy as art, (unpredictable, evolving), saw themselves as members of the community, giving back to community, viewed “teaching as mining” (Freire)

- **Social relations**

- Equitable teacher-student relationships, connectedness, develop community of learners that collaborates and takes responsibility for each other

- **Conceptions of knowledge**

- Knowledge is not static, Knowledge must be viewed critically, Teachers must build bridges to knowledge, assessment must be multi-faceted

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## Culturally Responsive Pedagogy

**It is not enough for teachers to  
know what the learner knows ...  
they also need to understand  
how students come to know or  
learn so that they can convey  
new knowledge through  
students' own learning systems  
(Geneva Gay, 2010, p. 176)**

## Research on CRP

- Marta Civil – Funds of Knowledge. Parents and students working together.
- Sonia Nieto - Creating Multicultural Learning Communities.
- Eric Gutstein – Social Justice Math
- Rochelle Guitierrez – Sociopolitical Turn
- Ubiratan D'Ambrosio – Ethnomathematics
- Arthur Powell – CRM Teaching as Respect for Diverse Mathematical Ideas
- Robert Moses – Math Literacy and Civil Rights. Algebra Project.
- Danny Bernard – Mathematics Identity
- William Tate – Critical Race Theory in Education

Culturally  
Relevant  
Cognitively  
Demanding Math  
Task Framework

- (A) ***Procedures with Connections*** to concepts, meaning and understanding of mathematics, culture and community
- (B) ***Doing Mathematics*** for the purpose of becoming empowered intellectually, culturally, politically and socially.
- *Extended the work of the Stein et al. (2000) framework on cognitively demanding mathematics tasks to including features of Culturally Relevant Pedagogy*
- Culturally Relevant Cognitively Demanding (CRCD) Mathematics Tasks (Matthews, Jones, & Parker, 2013)

# CRCO Math Task Rubric

Description	Degree in Task Structure		
	high	Moderate	low
Mathematics task explicitly requires students to inquire (at time problematically) about themselves, their communities, and the world about them.			
May draw from connections to other subjects and issues.			
Mathematics task draws from students' community and cultural knowledge.			
Task may explicitly seek to add to this knowledge <u>through</u> mathematical activity.			
Task is mathematically rich and cognitively demanding, embedded in cultural activity.			
Tasks asks students to engage the discontinuity and divide between school and their own lives – home and school.			
Task is real-world focused, requiring students to make sense of world through mathematics.			
The explicit goal of the task is to critique society—that is, make empowered decisions about themselves, communities and world.			

Description	Degree in Task Structure			Weighted Means <i>n</i> = 59
	High (3)	Moderate (2)	Low (1)	
Number of scores for 10 mathematics tasks reported by 4 – 8 teachers.				
1. Mathematics task explicitly requires students to inquire (at time problematically) about themselves, their communities, and the world about them.	16	24	19	1.55
2. May draw from connections to other subjects and issues.	12	31	16	1.53
3. Mathematics task draws from students’ community and cultural knowledge.	14	21	24	1.83
4. Task may explicitly seek to add to this knowledge through mathematical activity.	16	23	18	1.96 <i>n</i> = 57*
5. Task is mathematically rich and cognitively demanding, embedded in cultural activity.	24	27	8	2.27
6. Task asks students to engage the discontinuity and divide between school and their own lives – home and school.	16	28	15	2.02
7. Task is real-world focused, requiring students to make sense of the world through mathematics.	29	28	2	2.46
8. The explicit goal of the task is to critique society – that is, make empowered decisions about themselves, communities and world.	8	15	36	1.53

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What ways have you worked  
with PTs on developing CRP?

Discuss in small groups

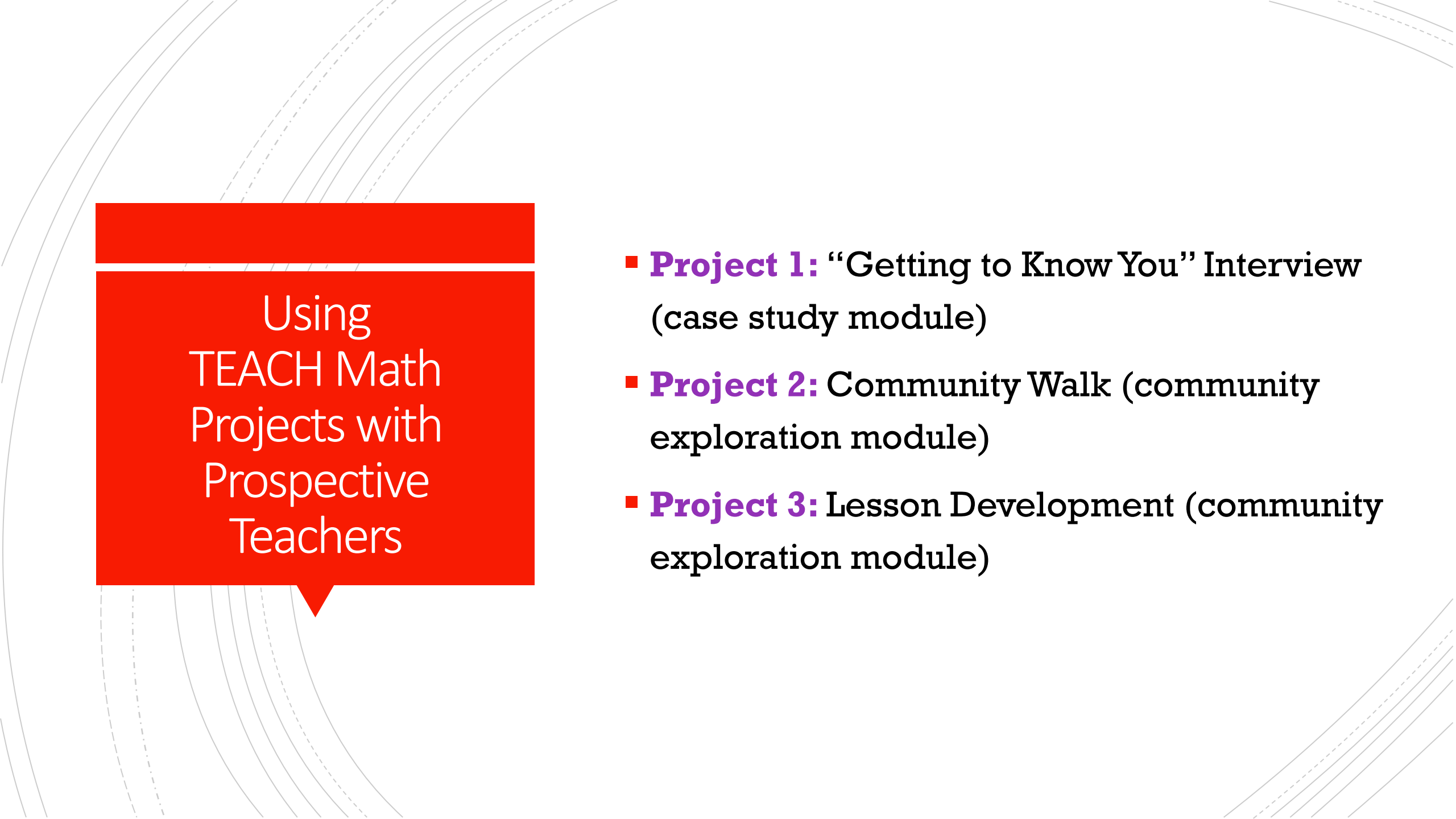
The logo for the Teach Math Project is a red speech bubble with a tail pointing towards the bottom left. Inside the bubble, the words "Teach Math" and "Project" are written in white, stacked vertically.

# Teach Math Project

(Drake, Aguirre, Bartell, Foote, Roth McDuffie, & Turner, 2015)

Retrieved from [www.teachmath.info](http://www.teachmath.info)

- Project Goals: study ways to support prospective and early career teachers in developing the knowledge, beliefs, dispositions, and practices needed to effectively plan, adapt and implement mathematics instruction in culturally, linguistically, and socio-economically diverse schools.
- Developed 3 modules of activities and projects
  - Community Practices
  - Community Exploration
  - Case Study

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## Using TEACH Math Projects with Prospective Teachers

- **Project 1:** “Getting to Know You” Interview (case study module)
- **Project 2:** Community Walk (community exploration module)
- **Project 3:** Lesson Development (community exploration module)

## Research from TEACH Math project

- 3 types of connections made to children's math thinking and funds of knowledge:
  - Emerging
  - Transitional
  - Meaningful (Aguirre, et al., 2012)
- Projects with substantive connections were connected to authentic math practices from the child's family or community (Turner, et al., 2014)
- PSTs recognize the importance of connecting with home and community practices; yet some exhibit lack of understanding as to why some families appear less supportive of academics (Foote, et. al., 2013)

## Preliminary Findings from our work

### Analysis of Project 3: Lesson Development

- Lesson topics related to child's culture, knowledge, or community knowledge
- The *depth* of the connections of lesson context and the math task to students knowledge resources varied widely
- Some lesson foci seemed closer to PT's knowledge or broader cultural knowledge than others (i.e. basketball, ChuckE Cheese, cooking)
- Within PT's that explored similar topic (i.e. basketball) there was difference in depth of drawing on community knowledge and resources.
- Conception of "*teaching as mining*" (Freire, 1974)? where teacher's responsibility is to pull knowledge out and build on knowledge students bring

A red speech bubble graphic with a white border, containing the text "Consider these questions".

Consider  
these  
questions

- Consider the range of ways that PTs make use of cultural/community resources in lesson planning.
- How can we further develop PTs CRP?
- How might we respond when PTs show a simplified idea of “culture”, or hold deficit perspectives?

# CRCRD Findings



## Rating the Tasks Using the Assessment Rubric

- **Weighty Issues** had the highest mean score for being CRCD
  - Teachers felt that the task highlights an important cultural issue – child obesity
  - To extend task – students can discuss factors that contribute to being overweight
  - Even rubric item #8 was satisfied (Task has explicit goal to critique society)
- **So You Think You Can Draw** was also scored as being highly CRCD
  - One teacher however thought the task had no real cultural relevance and another teacher thought it was geared more toward inner city students

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## Task 4: Weighty Issues

- According to a 2006 report from the Centers for Disease Control, 33.6% of Americans between the ages of 2 and 19 are either overweight or on the brink of becoming so, up from 28.2% in 2000. That's about 25 million overweight kids. Assuming this trend continues at a constant rate, how many kids do you predict to be overweight in the year 2050? What about the year 2100? Is it reasonable to assume a constant growth for this trend? Why or why not?

# So You Think You Can Draw



- Your sister loves street art. You would like to recreate one of her favorite pieces for her birthday. You decide to create a poster board replica of this piece even though you're not an artist. Suddenly a deeper side of the image strikes you.
- This is going to be easy! You notice the tip of his nose at  $(0,0)$ , the bottom lip at  $(0,-2)$ .....Where is his right eye, ...the bottom of his chin, ....the large patch of grass? What is the domain and range? Explain your reasoning. Try creating a replica on poster board.

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Artwork ©1994 Dave Kinsey (aka Büst) in Atlanta, GA.

Photographer © 1994 Ted Mikalsen. Used with permission from [www.graffiti.org](http://www.graffiti.org)

## Position Statements

- **Mathematics Education Through the Lens of Social Justice: Acknowledgment, Actions, and Accountability (NCSM & TODAS: Math for ALL)**
- **Access and Equity in Mathematics Education: What is required to create, support, and sustain a culture of access and equity in the teaching and learning of mathematics?**

## Next Steps

- Consider ways to develop PT's conception of *“teaching as mining”* (Freire, 1974)
- Further implement TEACH math projects, and study rationale for PT's choice of projects and the connections made to child and community knowledge

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