

# Considering Students' Strengths: Helping Elementary Preservice Teachers Take Account of Students' Resources in Planning and Teaching Science Lessons

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## Objectives of Research

- To understand how preservice teachers learn to read, evaluate, and adapt/modify curriculum materials to consider their students' cultural resources for learning
- To develop a scaffolded series of experiences to support students in critically planning for culturally relevant teaching through the analysis of curriculum materials.

## Challenges

### Challenges in learning to teach science across diversity

The Demographic Imperative (Banks et al, 2005)

- Homogeneous teaching force
- Demographic Divide: differences in educational outcomes and resources
- Differential treatment of students in schools

### Science, Youth, and Society

- Leveling the playing field (representation)
- The role and power of science (access to knowledge)
- Citizenship and Critical Science Agency (participation)

### Building a knowledge-base for teaching science across diversity:

More than just teaching science: Knowledge of content, pedagogy and curriculum is framed by one's attitudes and expectations, views of science and schooling, and knowledge of how to incorporate other cultures, experience, and needs of students into the daily routines of schooling.

Teachers as Cultural Brokers (Banks et al, 2005)

- Vision** for teaching science for social justice: *taking a stance on schooling and science*

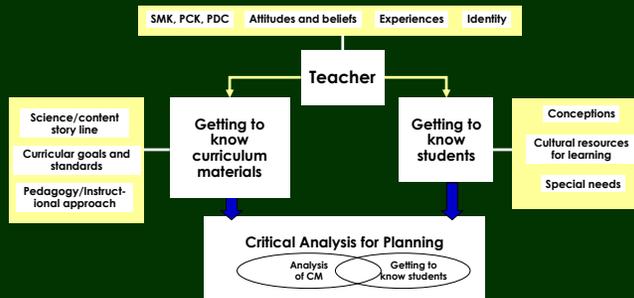
- Challenging cultural assumptions and how these shape practice
- Purposes and goals of science education

- "Think pedagogically"** about diversity: *Getting to know students, Getting to know curriculum*

- Science teaching as **culturally responsive practice**
- Adaptive expertise:** moving beyond existing routines

- Building bridges** between school, science and students: *Critical analysis for planning*

## Framework: Role of Curriculum Materials in Supporting Culturally Responsive Science Teaching



## Culturally Responsive Planning & Teaching

Shapes and fits into an empowering composite classroom culture by:

- Bridging**
  - Culture, knowledge and practices of science, schooling, and students
  - Differences between cultural and science practices and perspectives
- Engaging students in**
  - Questions that are relevant and leverage student funds of knowledge
  - Relevant experiences with phenomena
  - Developing explanations for patterns
- Attending directly to**
  - Learning goals
  - Making patterns in experiences explicit
  - Using science in contexts relevant to students' sociocultural backgrounds
  - Citizenship and agency
  - Students' special learning needs (ELL, spec ed)

## Unpacking Cultural Resources for Learning

- Children have a wealth of experiences that are powerful and that can support them in developing scientific literacy.
- Many of these experiences for children from non-mainstream backgrounds are not recognized as legitimate sources of knowledge/practices.
- Building instruction upon these experiences supports meaningful learning and positive identities in science.

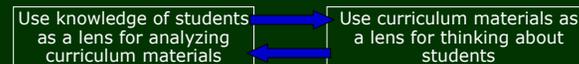
Lenses for teacher learning about student cultural resources

**(1) Funds of knowledge** - those historically developed and accumulated strategies (e.g., skills, abilities, practices) or bodies of knowledge essential to a community's, family's or peer group functioning and well-being.

**(2) Youth ways of looking at the world**- includes all the social ways of knowing and doing things that kids use that are grounded in where, when and among whom a child grows up.

## Unpacking Critical Analysis for Planning

During critical analysis for planning, teachers make planning decisions that take into account both science content and students' resources for learning.

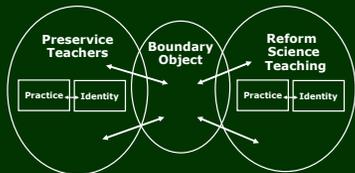


Questions for Curriculum Materials Analysis	Questions for Knowing My Students	Questions for Lesson Planning
Example: Is there a relevant, interesting, motivating, understandable problem that addresses the learning goal?	Example: What problems are relevant and interesting to my students? How can I connect to my students' lived experiences?	Example: What relevant, interesting, motivating, understandable problem will I use? How is this problem related to my students' lived experiences?

## Findings

### (1) Boundary Encounters & Objects

Critical analysis for planning for culturally responsive teaching entails practices whose meanings are not readily accessible to preservice teachers. Boundary objects and encounters help preservice teachers expand their images of teaching, shift their teaching identities, and develop new practices that align with culturally responsive teaching and reform-based education.



**Boundary Encounters & Objects:** Book Clubs (*Ways with Words*), Science in Lansing - community interviews, Curriculum Materials Analysis, Field Placement Classrooms, Composite Culture Assignment,

### (2) Tensions

Preservice teachers

- Demonstrated thoughtful consideration of students' cultural resources when reflecting about students.
- Focused primarily on science content when analyzing curriculum materials and planning lessons.
- Consideration of students during analysis and planning reflected "topical connections" (i.e., my students have seen erosion at the beach).
- Preservice teachers began to expand analysis of curricula from content-only to also include ways of knowing and science practice when they reflected on their lessons and placements through the lens of cultural resources.

*"Catherine and Pat spend the ten minutes of free time before lunch flipping through teen-oriented popular culture magazines, focusing their attention to stories about 'rappers and fashion.' Their admiration for the magazines provokes them to design their own publication called 'Cool Teen Fashions,' for which they write short articles and draw illustrations during inside recess...The relationships that the girls have with magazines enables them to access science knowledge more readily from the science periodicals that [are] available in [the science] room. The girls habitually reference these sources for information, which is unique in that most students in the class more habitually look to their textbooks. ... As a teacher, I must be able to refine my methodologies so that they thoroughly incorporate the funds of knowledge that my students bring from their households, as well as the youth genres students employ for communication and interaction." (Trevor, Reflection #3)*

### (3) Issues of Authority

#### Curriculum as Authority

Preservice teachers' modifications to curriculum materials reflected references to students' prior experiences and real world connections.

- Reflects the science vs. students tension
- Suggests that preservice teachers are uncomfortable making significant modifications to the structure or content of curriculum materials they may see as authoritative

#### Teacher as Authority

Some preservice teachers expressed an unwillingness to make modifications based on student perspectives because they felt it undermined the teachers' classroom control.

*"I think it is inappropriate for the students to think they can manipulate the situation to get what they want ... I'm not going to stop my learning goals and reinvent things because they want me to." (Brenda, transcript from class discussion)*

## Conclusions

- Boundary encounters are generative. As preservice teachers have multiple boundary encounters, their images of culturally responsive teaching may grow, providing opportunities for development of new identities. As a result, their curriculum materials analyses and lesson planning may shift toward more culturally responsive practices.
- Tensions encountered when engaging with boundary objects may provide preservice teachers with insight into the "critical junctures" between identity and practices.

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