Advancing STEM Teaching and Learning in New York City's Metropolis:
Utilizing Students' Cultural Capital to Increase Enthusiasm, Interest and Competence in Course Content

Teach@CUNY Day

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Whether it's improving our health or harnessing clean energy, protecting our security or succeeding in the global economy, our future depends on reaffirming America's role as the world's engine of scientific discovery and technological innovation.

President Barack Obama

How does this reaffirmation impact CUNY's diverse STEM learning environments?

Born Into a Dominant Culture

How does America's reaffirmation impact CUNY's diverse STEM learning environments?

"Diversity of perspectives, ideas, and priorities comes from varied backgrounds, experiences, and cultures, and can help shape science and engineering"

Factors Influencing Students'
Interest and Participation in STEM

Student impressions and involvement with their STEM classrooms are commonly mediated by:

(a) the type of curriculum used and its implementation
(b) familial involvement in formal and informal exposures to STEM
(c) quality of instruction and instructors
(d) student accessibility to instructors, staff and administrators

<div align="right">Armstrong and Thompson, 2003</div>

Factors affecting how instructors view their urban STEM students can include:

(a) a student's standardized achievement test scores
(b) the type and frequency of a student's participation in class
(c) student classification (e.g. special education, English language learner, etc.)
(d) familial involvement of a student
(e) implications that can become aligned or misaligned with issues related to race, ethnicity, class, gender, language differences and age in the teaching and learning of STEM.

These factors become implicated in the unfolding of social life at levels of understanding of which one is both aware and often- times unaware.

When you are born into a different culture with an ability for greatness and then are forced to learn another culture's ways but are not allowed to participate, it's like being taken to an ice cream shop to look at the goodies but not being allowed to taste them.

Carmen deLavallade, 2015

Born into a Different Culture

Questions to Consider

1. What roles have power, culture and social dynamics played in your STEM teaching and learning experiences?

2. What evidence will you provide on Day One of your course to students who are different from you (racially, ethnically, culturally, and in their STEM exposures), that they can and will be successful in the subject matter?

3. What roles do you imagine student feedback will have in engaging diverse students in conversations about their STEM learning?

4. Describe a major challenge that you encountered when pursuing your STEM endeavors. How did you address the challenge?

5. It has been said that teaching well is a fine art. What do you need in order to teach STEM well to a diverse student body?

What Needs to Shift?

We need to shift the ways that we think about and practice how STEM is taught and learned

teaching | learning

individual | collective

Capital

"accumulated labor which when appropriated on a private, i.e., exclusive, basis by agents or groups of agents, enables them to appropriate social energy in the form of reified or living labor"

(Bourdieu 1986, p. 241)

FORMS of CAPITAL

: (a) economic, (b) CULTURAL and (c) social.

CULTURAL capital can be viewed as
- embodied
- objectified (physical "things")
- institutionalized state (e.g. EDUCATIONAL)

CULTURAL capital can be acquired **unconsciously** –
something to keep in mind when considering the urban **STEM** classroom.

Culture

dialectical relationship of schema and practices—a system of symbols and meanings

(Sewell 1999)

schema | practices

teaching and learning is a form of cultural enactment
that can simultaneously be
produced, reproduced and transformed
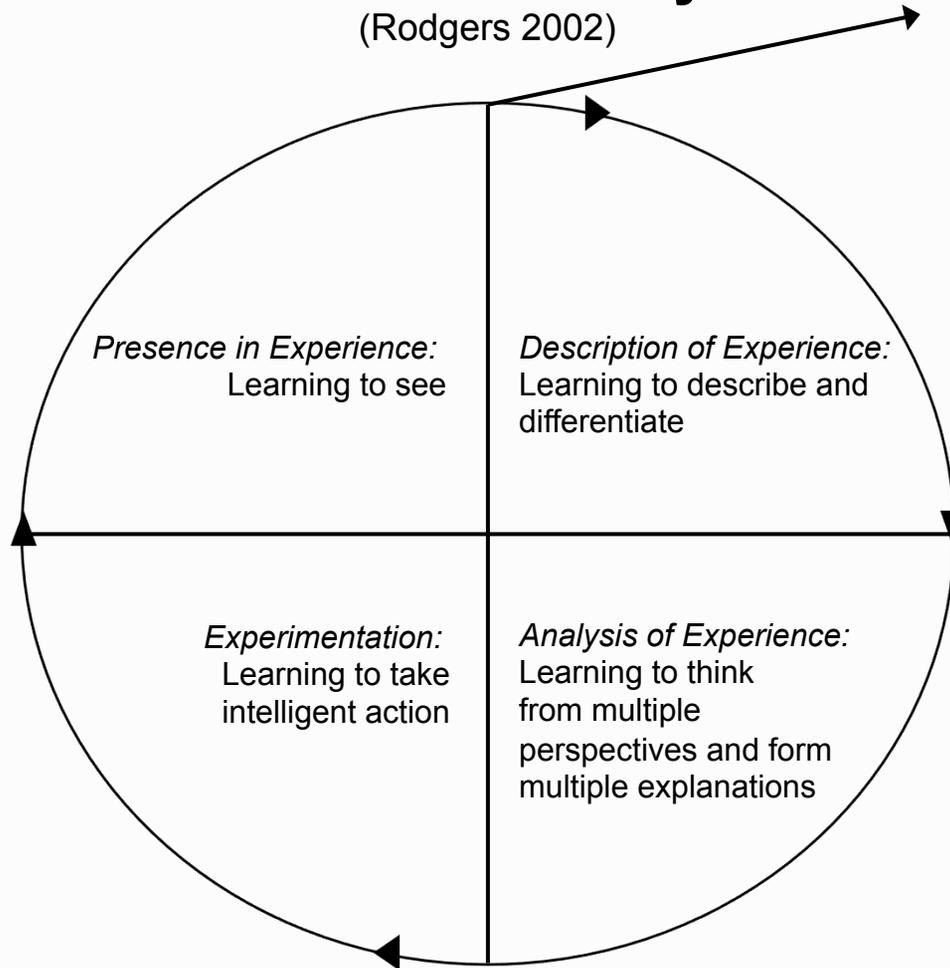
(Roth and Tobin 2006)

Instruments for Change

- Refective Practices
- Cogenerative Dialogues
- Heuristics
- Learning about the similarities in difference from successful diverse STEM professionals

Reflective Practice

The Reflective Cycle
(Rodgers 2002)

Presence in Experience:
Learning to see

Description of Experience:
Learning to describe and
differentiate

Experimentation:
Learning to take
intelligent action

Analysis of Experience:
Learning to think
from multiple
perspectives and form
multiple explanations

Cogenerative Dialogues

Cogenerative Dialogues or Cogens

structured conversations that are geared toward creating agreed upon measures to improve the teaching and learning/working environment, while holding participants involved in them accountable for actualizing desired outcomes

Roth and Tobin 2006

Participants experience them as important spaces where tools and structures enable the creation and execution of desired processes and outcomes. These include concrete steps related to sharpening communication, enhancing collective thinking, and building content knowledge. Additionally the development and sustaining of positive emotions and solidarity are experienced.

Bayne 2009, 2013

Cogen culture is simultaneously produced, reproduced and transformed to meet goals and motives

Critical Examination

Critical Evaluation

Participants reflect upon shared experiences; mutually agreed upon changes are made to improve teaching, learning and other related experiences

The environment is one in which participants work together and learn from one another; ideas are shared within an atmosphere of respect, democracy and shared visions

Communication is consistent and constructive; solutions are generated locally; ethical values are embedded in pluralism and respect

Cogens Bring into Focus

1   Respect

2   Creating Solidarity around Difference

3   Identify and Resolve Contradictions

4   Learning from the Other

5   Polysemia and Polyphonia

6   Individual and Collective Agency

COGENS

- "just" after class conversations

- "just" talk

- "just" an office hour appointment

- "just" a venting session

COGENS ARE

important spaces where tools and structures enable the creation and execution of desired processes and outcomes

Heuristics

sets of characteristics which are salient to the contexts in which the construct is applicable

- cogenerative dialogues
- mindfulness

Sample Items on the Cogenerative Dialogue Heuristic

1. There is a place for me to speak. Therefore, I speak as much as others.
2. Others have the opportunity to speak as often as I do.
3. My talk is respectful.
4. The members of my group show respect for one another.
5. When I talk, others listen to what I have to say.
6. When others talk, I listen to what they have to say.
7. I try to understand different perspectives.
8. Others value my contributions to dialogue.
9. I feel as if I belong with this group
10. The members of the group have a sense of solidarity.

Sample Items on Mindfulness in Education Heuristic

During this class:

1. I notice my emotions without reacting to them.
2. I am kind to myself when things go wrong for me.
3. I recover quickly when things go wrong for me.
4. Even when I am focused I use my senses to remain aware.
5. When I am emotional, I notice my breathing.
6. When I am emotional, I notice my heart beat.
7. I maintain a positive outlook.
8. When my emotions change I notice changes in my body temperature.
9. I use breathing to manage my emotions.
10. I am kind to others when they are unsuccessful.
11. I can tell when something is bothering another person.
12. I am aware of others' emotions from the tone of their voices.
13. I recognize others' emotions by looking at their faces.

Triumphs and Challenges in the Pursuit to Advance STEM Teaching and Learning in New York City's Metropolis

Diverse voices from STEM faculty that

Teach@CUNY

Thank You!

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