

Improving Classroom Discourse to Support Communication, Equity, and Students' Agency

Supporting the Relational Standards
in the Mathematics Classroom

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NCTM Standard
of
Communication
and Principle of
Equity

Teachers
attempting to
create
classrooms
that foster
these
standards

CCSS of
Mathematical
Practice

Overview

What do you think of when you think of Communication in the math classroom?

What is the purpose of questions?

How do students talk?



Is there Equity in the typical mathematics classroom?

Are all voices heard and valued?

Is there a hierarchy in the structure of authority?



In what ways are students agents of their own learning?

In what ways might this happen?

What is student agency?

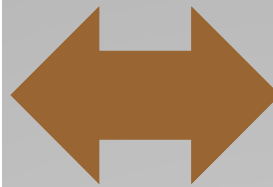
How do we meet these standards?

- the ability to act in a willed or voluntary way
- having the capacity to behave in an *autonomous or independent way on one's behalf* while learning in the classroom

(Biesta & Tedder, 2006)

What is student agency in learning and what does it have to do with the standards?

Marginalized
Student Groups
in Mathematics



Inclusion,
Ownership
Relationally-
Based
Education

What's the big deal?

- Are there teachers that teach with these standards in mind?
- What are their best practices?
- What can we learn from them?
- What are the effects of their behaviors in the classroom?

Questions I Asked...

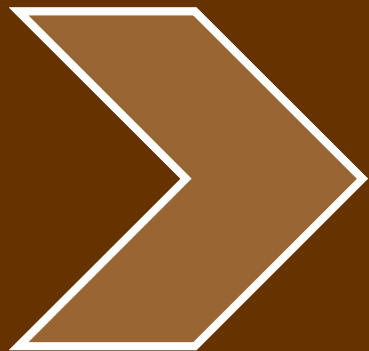


Problem-Based Learning - teacher facilitated approach to learning where complex problems are discussed by students using their prior knowledge and enabling problem solving skills (Hmelo-Silver, 2004)

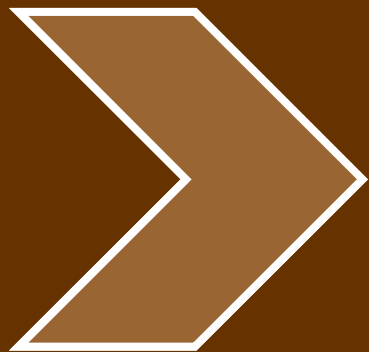


A Pedagogy of Relation- collective and individual empowerment, ownership and authorship of material, dissolution of hierarchy in the classroom community and a movement to work for social change (Anderson, 2005; Jacobs, 1997; Solar, 1995, Bingham & Sidorkin, 2004).

Key Definitions

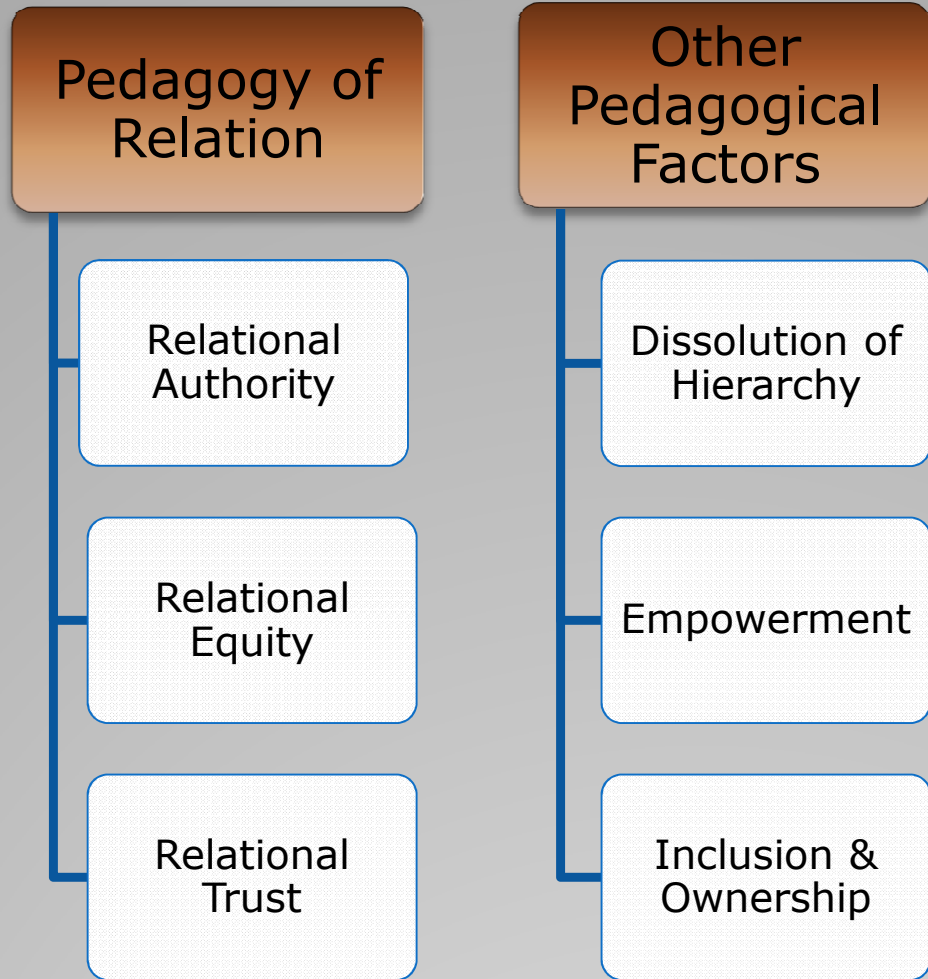


In what ways does a teacher who claims to attempt to empower students and create equity in the learning process use discursive methods to attain that goal?



Specifically, what aspects of classroom discourse define a Problem-Based Learning mathematics classroom situated in a pedagogy of relation?

Research Questions



Evolved Theory

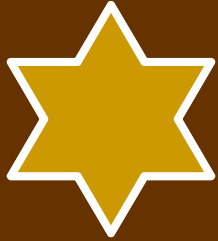


Classroom Video Observation

Analysis of Dialogue Transcription

Teacher Interviews for Member
Checking

Methodology



Constructivist Grounded Theory Model:



Qualitative unit of analysis: excerpts of dialogue, interaction between student-to-student, teacher-to-student



Qual/Quant: Self-reference occurrences in pronoun use

Data Analysis

Observed Behavior	Fostered Value	Intended Outcome
Intentional Teacher Questioning	Conjecturing, Explaining	Perseverance, Communication
Withholding	Independence of Thought	Student Agency, Perseverance
Inclusive Pronoun Use	Safety, Ownership	Equity
Teacher Self-Correction	Learning from mistakes	Equity, Agency
Nonjudgemental Language	Independence of Thought	Agency, Communication
Politeness	Inclusion	Equity
Naming Differences	Valuing multiple perspectives	Student Agency, Critiquing

Framework for Observable Characteristics

Valuing Intuition & Naming Differences

Teacher: 'Really nice, nice, three different ways of solving that problem. Very, Very nice.'

Findings

Teacher Self-Correction

Teacher: 'Oh no... oh, sorry... it says find the equation of line BC, I'm sorry, ... go ahead you can use either choice.'

Findings

Withholding

Teacher: What's different about the formulas for the transformation that would indicate that one might be a mirror and that one might a vector translation?

Carrie: The numbers are the same?

Mary: The x and y are switched?

Lee: Instead of $[x+2, y-1]$, and now it's y plus or minus something and then x plus or minus something.

Carrie: Oh so, it would be a reflection if the y and x are switched.

Findings

Politeness and Hedging

Teacher: 'When can we set up equivalent...**like** a ratio between sides? What has to be true about those triangles? We haven't **really** talked much about this...They have to be similar, and these aren't going to be similar figures. So I see **a few** hands up, first of all let's make sure Fiona, that we... understands that scenario, so can we **maybe...**'

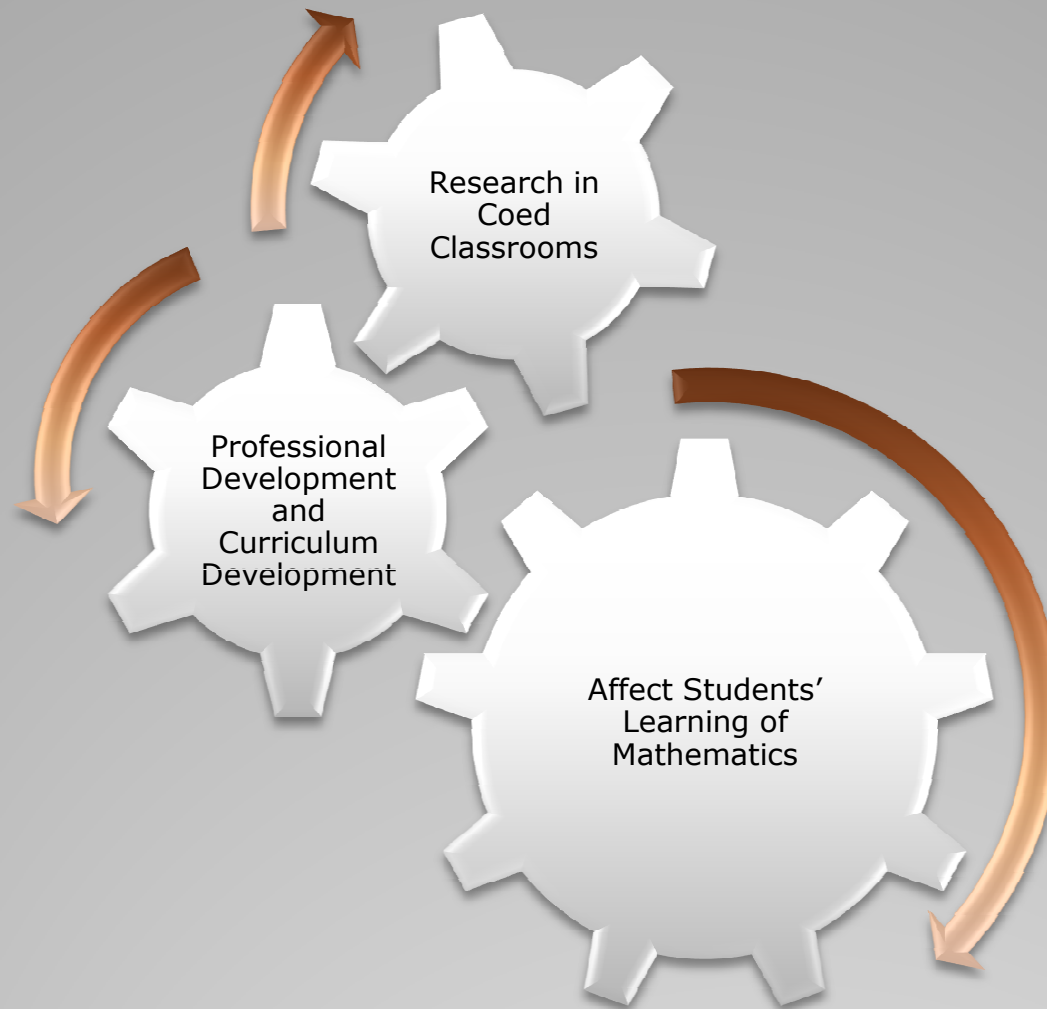
Findings

Total Teacher and Student Pronominal Use

Individual	I	Inclusive We	Generalized You	Specific You
Teacher	65	80	183	73
Student	185	150	207	75

- Student self-reference rate of 1.4 times per minute ('I' by individual or 'we' in pairs)
- Teacher and student 'other' reference at same rate (specific 'you' use)

Findings



Implications for Future Research and Practice

Clear characterization
Teacher Discourse
moves

Do these effect
the outcomes in
the ways that the
teachers intend?

Conclusions