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Implementing Group Interactions to Encourage Peer Teaching, Social Relationships, and Collaborative Problem Solving in Mathematics Classroom

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Collaborative Problem-Solving, Peer Teaching and Social Relationships in Mathematics Classrooms

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RESEARCH QUESTIONS

How does small group interaction facilitate students' mathematical understanding?

What types of teacher-student interactions promote learning during small group work?

METHODOLOGY

- *Participants*: 100 students from a rural high school
- *Data Sources*: Questionnaires and Exit Slips, Video Recordings, Teacher Journals
- *Data Analysis*: Grounded-Theory (Glaser & Strauss, 1967)

FRAMEWORK

Cazden and Beck's (2003) Elements of Cooperative Learning :

- Collaborative Problem Solving – students collaborate as equals and be "multi-vocal"
- Peer Teaching – students collaborate in assigned roles
- Social Relationships – student bonding, which is observed though body positioning and gestures

LITERATURE REVIEW

Barron (2000) concluded from his study that coordination was the key to group work. There must be mutuality, joint attention, and shared task alignment for positive problem-solving outcomes to occur. Esmonde (2009) concluded that assigning roles during group work helps create equity because it ensured all students participate. One teacher in Gillies and Boyle's (2010) study urged teachers to also let their students grow through the process and find their own voice in small groups.

RESULTS

1. Collaborative Problem-Solving – partner activities, including dominoes and dots. Students challenged each other and collaborated because their answers depended on each other. This collaboration enhanced students' level of mathematical understanding .

2. Peer Teaching – homogeneous groups with assigned roles.

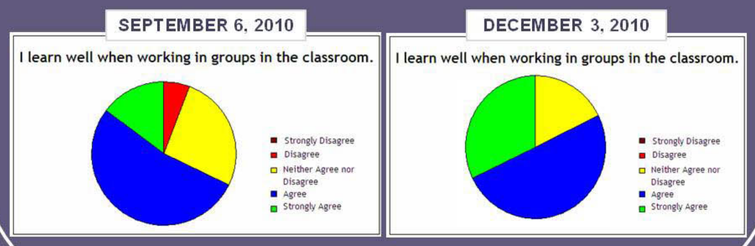
High-level Group	*vs.*	*Low-level Group*
• Motivated one another • Achieved high level of mathematical understanding and went beyond the assigned activity		• Needed extra motivation to collaborate • Still achieved adequate level of mathematical understanding

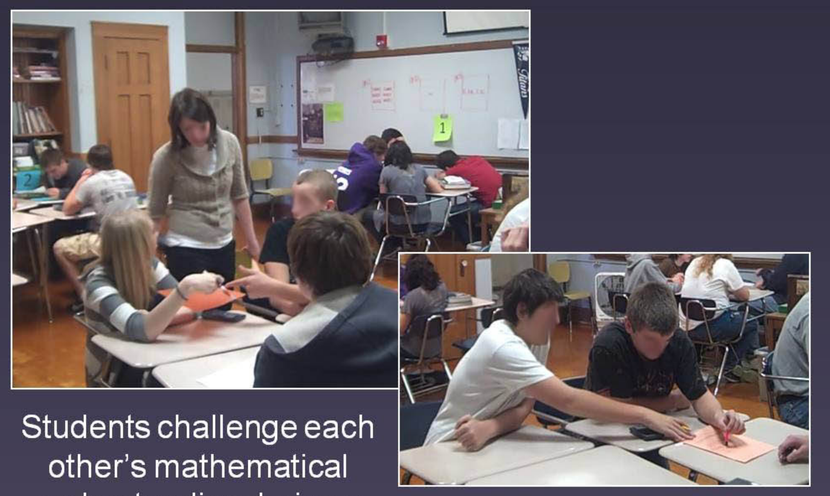
3. Social Relationships

Students who faced each other and made eye contact with one another generally showed more mathematical understanding on the activity.

Those who were comfortable working with others and those who were generally social performed better in group activities.

With expectations and clear guidelines, students expressed that they learned more in groups in the end of the semester than in the beginning of the semester (see graphs below).





Students challenge each other's mathematical understanding during a peer teaching activity.

"Working in groups is good because I'm too shy to talk aloud to the whole class [and] you get to interact with classmates and learn new ways to do things"
-Student response

CONCLUSIONS

- Cooperative learning facilitates mathematical understanding when (1) expectations are set, (2) clear instructions are given, (3) students are open to collaboration, and (4) positive social relationships are taking place.
- Cooperative learning is productive when the teacher models, facilitates, and coaches in the classroom.

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