

INVESTIGATING PEER AS “EXPERT OTHER” DURING SMALL GROUP COLLABORATIONS IN MATHEMATICS

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Context

- Students are more likely to achieve fruitful discourse (i.e., open, collaborative discussion, and argumentation) when learning occurs *outside* of the immediate range of the teacher (Barnes & Todd, 1978);
- Students need to be in the “presence of a more highly structured awareness” (i.e., people) (Sfard, Neshet, Streefland, Cobb, & Mason, p. 49);
- Students working in small groups often reflected a small class setting where one student takes on the role of the teacher (Adler, 1998);
- Peer discourse is reflective of *symmetrical* relationships; thus, the role of “teacher” may only be illusionary (Mercer, 1996).

Theoretical framework

- Social constructivist framework;
- Knowledge is a reconstruction emerging externally from interactions with people, activities, and cultural artefacts (Vygotsky (1962; 1977));
- “The path from object to child and from child to object passes through another person” (p. 30).

Methodology

- *Interactional sociolinguistics* and *video study methodology* (Kotsopoulos, 2007);
- 2005-2006 school years;
- Eighth grade classroom (34 students);
- Data sources: In-class observational field notes taken during non-collaborative learning and teaching, student interviews, one teacher interview, **38 hours of video and audio taped peer collaborations**, over three different mathematical tasks, student artifacts, socio-metric questionnaires, focus group session;
- Video and audio data were transcribed and analyzed.

Results

- An obvious “expert other” does not actually emerge;
- Mathematical foreman;
- Mathematical laborer;
- Teaching by telling;
- Teaching by managing;
- Completing by doing.



Educational significance

- Calls into question the potential of a peer to act in the capacity of “expert other” in a group setting;
- Also calls into question the ways in which “expert other” is defined;
- “Expert other” has particular and specific skills and knowledge in relation to a discipline, topic, or field.

Questions, comments, and feedback

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Interactional sociolinguistics

- (1) Communication is context-based;
- (2) Communication may still occur regardless of intention;
- (3) Intersubjectivity is not *a priori* but rather potentially a product *of* communication;
- (4) Social and *situated identities* impact communication;
- (5) Knowledge is a construct of culture and context.



Video study methodology

- (1) **What** is said to another (actual words used) and **how** one makes sense of what is said is shaped by **how** things are said;
- (2) **Actions**, with or without words, can also project meaning - intentional or otherwise;
- (3) Individuals can come to know something about themselves and others through interactions;
- (4) Participants interpretations/perspectives of their video performances are central if the research is intended to be transformative in some way.
- (5) Video modeling enables participants to be “co-constructors of knowledge” (Sleeter, 2001, p. 236).

More theoretically than video as data.



Analyzing the Data (seven stages)

- (1) Multiple viewings of the videos;
- (2) Defining 'episodes of communication';
- (3) Coding types of mathematical talk (Pirie,1998);
- (4) Coding tacit function of the communications (Mercer, 1996, p. 368);
- (5) Coding episodes according to level 1, 2, 3, or 4 of communication using the current grade 1-8 Achievement chart for communication in mathematics;
- (6) Identifying and coding 'receiver' of the episode of discourse;
- (7) Theory building.

Tasks

Task 1: Open box-top problem

Construct an open-box top out of a sheet of 20 cm by 30 cm by removing perfect squares from each corner. Determine the dimensions of the box that would hold the largest volume and conjecture what might be the dimensions of an open box that would optimize the volume given *any* size of paper. (3-70 minute periods)

Task 2: Battling the bull's eye

Design packaging for a new 'energy' drink with a total volume of no more than 250 ml. The packaging should be designed such that when the product was placed for sale on the store's shelf, a large surface area would be visible to consumers in order to create a more significant visual draw of the product. (3-70 minute periods)



Task 3: Stock market game

The task involved financial mathematics. Students in their respective groups were given \$100,000. Each week they would buy and trade stocks and mutual funds with the goal of earning the most money possible, or in other words growing their stock portfolio. (10-70 minute periods).