A Comparative Analysis of Understanding Practices in the VMT Environment

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Abstract: The oriented question of this symposium is, what are the appropriate methods and frameworks for studying practice in CSCL environments? To foster a useful dialogue on methodology, we apply a “comparative analysis” of computer-mediated interactions taken from a common data source of Virtual Math Teams (VMT) environment.

Introduction
A close attention to understanding and learning practices in technology-enhanced settings has been an earmark of CSCL research from its earliest days. Roschelle (1992), for example, documented in a detailed way the interaction between two students as they worked together at a computer. His analysis built upon an established and well-developed tradition of research on talk-in-interaction (Sacks, 1992; Jordan & Henderson, 1995). Programs of study focusing on interaction thin computer-mediated environments, however, are much less well-developed.

Grimshaw (Grimsaw, Burke & Cicourel, 1994) introduced the idea of a “comparative analysis” whereby a team of researchers, often with disparate backgrounds and interests, agrees to study a common set of materials. Exercises of this sort have been undertaken several times in education (e.g., Koschmann, 1999, in prep; Sfard & McClain, 2002). The participants in this symposium will present four different analyses of computer-mediated interaction taken from a common data source. In this way, we hope to challenge each other with regard to what can be found within these materials. Our goal is to engender discussion about methods and frameworks for studying the practices of producing understanding within online environments. A critical commentary will be delivered by the symposium discussant, Graham Button, following the four presentations.

The VMT Environment
The materials to be analyzed here represent the interactions of one particular team (Team B) who had participated in the 2006 Virtual Math Teams (VMT) Spring Fest. The three students worked and interacted within the VMT environment designed by the Math Forum at Drexel University (mathforum.org). The VMT environment supports collaboration at a distance using text-based, synchronous communication and includes a whiteboard with special functionality for referencing and a wiki for sharing findings with other teams. They worked together for four sessions, each of approximately one hour in length, and spaced out over a two-week period (see Medina, Suthers & Vatrapu [2009] for a description of Sessions I-III and Stahl [2009] for a description of Session IV). The problems with which they were engaged have to do with algebraic representations of graphical patterns.

The students’ interaction was recorded and can be replayed using the VMT Replayer application. Their textually-mediated interaction—with closely coordinated inscriptions in the text chat, graphical whiteboard and shared wiki—provides a rich set of materials for examining understanding practice within computer-mediated interaction.

Presentation 1: How (not) to Build a Pyramid in the VMT Environment
Authors: Christian Greiffenhagen (University of Manchester) and Jacqueline Eke (Manchester Metropolitan University)

Abstract: In their second and third problem-solving sessions, the students in Team B decide to use blocks to construct a graphic pattern of a pyramid. This entails a discussion of what this ‘pyramid’ should look like. As becomes clear, different ideas of arranging the blocks into a pyramid format exist among participants (one of the participants writes: “You[re] thinking of the kind of pyramid that is flat on one whole edge. I mean like a real pyramid that each layer is completely centered”). In other words, participants have some difficulties in determining the exact shape of the pyramid that they want to work on.

The discussions surrounding the shape of the pyramid are rich and complex and therefore form an ideal environment in which to explore the following themes:
• the unusual nature of the task: rather than finding a solution to a teacher-given problem, students here are faced with the task of finding a problem to work on;
• the affordances of the interface: students must find ways of representing a three-dimensional shape (a pyramid) using a text-based chat room and a two-dimensional whiteboard;
• issues of common understanding: as a researcher, making sense of what is going on in these sessions is extremely difficult; however, in this case, this is an issue for participants themselves who have difficulties of establishing that they share a common understanding of the shape that they are working on; that is to say, the ambiguity over the shape of the pyramid is an issue for both participants and researchers.

Presentation 2: Understanding Work in the VMT Environment: Formulas, Variables and Explanations
Authors: Timothy Koschmann (Southern Illinois University), Gerry Stahl, and Alan Zemel (Drexel University)

Abstract: The initial task in the VMT Springfest 2006 was summarized in a table showing two geometric progressions. The first three elements in each were supplied and the participants were asked to compute the next three for both series and identify a “pattern of growth.” One way of summarizing the “pattern of growth” would be to develop algebraic formulas expressed as a function of N, the level in the table. The participants of Team B—Azmx, Quicksilver and Bwang8—were able to fairly quickly produce such formulas for this and a related problem, but difficulties arose when they tried to explain the formulas for themselves and others. These difficulties persisted throughout the four sessions of the exercise. Our title, therefore, is a little play on words. It simultaneously specifies the analytic topic (participants’ understanding work) and our analytic approach (analyzing how the participants produce their work as understandable).

We focus chiefly on some confusions that arose in Session IV. In this their final problem-solving session, Team B reflected on their previous work together and considered how to summarize it for others. Our interest is in the mundane practices whereby they make their actions understood to each other and to the wiki audience. We begin from the assigned task, then document just what the participants actually did and then, finally, advance to our chief analytic task, explicating just how they did what they did. Influenced by the Ethnomethodological tradition in sociology and borrowing methods and findings from Conversation Analysis (CA), we seek to document these understandings within the details of the participants’ interaction. We examine in particular how some findings developed in CA might be applied to text-chat interaction.

Presentation 3: Using Commognitive Lens to Analyze the Development of Algebraic Discourse in the VMT Environment
Authors: Anna Sfard (Univ. of Haifa & Michigan State Univ.) and Shai Caspi (University of Haifa)

Abstract: According to the commognitive framework, thinking is an individualized form of interpersonal communication, whereas learning a particular subject, such as algebra, is the process of shaping discourse in a particular way. Four features of the discourse are likely to be modified in this latter process: the use of words and of visual mediators, endorsed narratives and discursive routines. In our analysis of the data, we will focus on how the participants construct their use of algebraic mediators (traditionally known as “representations”). While doing this, we will also speculate on the question of how the VMT environment might have affected the process (this will be done by comparing the present findings to what is known from the burgeoning research on learning algebra in more traditional classroom settings).

Presentation 4: Tracing the Development of Representational Practices
Authors: Dan Suthers, Richard Medina, & Ravikirian Vatrapu (Univ. of Hawaii)

Abstract: Our analysis of the VMT data focuses on the development of representational practices. Our method traces contingent relationships between events at two granularities. We begin with an event in which the group is applying shared practices for the class of mathematical problems under consideration. In this event, participants construed certain inscriptions as representational resources for resolving the question at hand. We then search backwards to find chronologically prior episodes in which these and related inscriptions are constructed, resulting in a sequence of episodes through which the representational practices were developed. We then work forwards within each episode to construct an account of how the inscriptions become representations through the negotiated practices of participants, using methods similar to conversation analysis but attending to inscriptive acts as well as conversations in the chat tool. The resulting account shows not only how practices are negotiated locally, but also how prior work is re-invoked with the aid of persistent inscriptions. Intersubjective meaning-making takes place in interaction, but not in a vacuum: it draws on the history and resources of the group.
References