Looking at Changes in Student Understanding Using a Situation Model Analysis of Discourse

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It is commonly assumed that readers construct mental models from discourse combined with prior or world knowledge. According to the van Dijk and Kintsch model (1983), readers construct a situation model from the combination of the text they read (or hear) with prior knowledge. A number of investigators have made use of this idea, for example, to examine how readers organize their understanding of a narrative (Bower & Morrow, 1990), to examine how text coherence affects' how readers integrate new ideas with prior knowledge (Kintsch, 1994), or to describe how students solve problems (Nathan & Kintsch, 1992).

Other researchers have focused on how students collaborating to solve a problem co-construct a shared understanding of the problem and possible solutions. This research has shown that as collaborators work to understand each other, they are able to understand the problem at hand in ever-increasing depth and detail (Miyake, 1986). This is due at least partly to the process of negotiating shared meanings, as collaborators must elaborate and clarify their understanding for each other (Moschkovich, 1996), using the structuring of their interaction as a resource(Roschelle, 1992).

By representing students' understanding in discourse as the construction of situation models, I adapt the methodology of analyzing text for situation models in order to further understand how collaborating students construct shared understanding of a problem. I examine in detail the process of changing understanding within a single conversation, as well as changes in how a student or group of students work with the same problem situation at two different points in time (as in a pre- and a post-test).

I do this by treating their discourse as a text which can be segmented into time-steps that correspond to building blocks or revisions of situation models. I assume that the situation models which students construct in discourse are built from two resources: the student's (students') own history (histories) with the topic, and the particular history of the current discussion. Taking into account the history of the discussion, I infer the situation models that students are constructing at each step in time.

Assuming that the situation models represent student understanding, I look for changes in student understanding as changes in the situation models, either within a stretch of discourse, or between two similar texts that are separated by time (a pre-interview and a post-interview). With a record of the student discussion, I infer some of the prior understanding a student (or group of students) is bringing to a topic. Using this method, I have gained insight into complex discussions, by examining the assumptions underlying the talk, and the inferences being made as the discussion progresses.

The construction and revision of situation models in discourse is an ongoing process. Situation models evolve with the discussion, as students use their experience with a topic to discuss a problem. At the same time, situation models are the basis of the discourse. By focusing on the development of understanding as a process of constructing situation models, Greeno, Engle, Benke and I have been able to make salient the discourse practices and other aspects of the activity of learning (Greeno et al., submitted). We have examined the process of the activity of learning, as participants construct, order, and reorganize their understanding of a concept or situation.

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