There is ample evidence that analogical reasoning contributes to the construction of knowledge in students’ learning. Nevertheless, the research literature has failed for the most part to deal with the fact that students do not always “buy” these explanations and that individuals differ in their response to analogical explanations. This talk presents findings from a study that follows ongoing reasoning processes prompted by instructional analogies in physics. Determining what individuals know and how this changes as they learn is an important and difficult question that is inextricably linked to one’s epistemological perspective. This study is guided by the Knowledge in Pieces (KiP) perspective on conceptual change (diSessa, 1993). KiP is an evolving heuristic framework for describing knowledge in use and in development. An inherent difficulty in the KiP related methodological program is that the researcher has no direct access to the learner’s knowledge system. In this presentation I discuss how specific knowledge elements and the dynamics of the knowledge system can be inferred from authentic learning events, and what this in turn can tell us about processes of learning and conceptual change. Building on a bottom-up analysis to explain students’ individual responses to instructional analogies, we developed a model of explanation and change in explanation focusing on knowledge elements that provide a sense of satisfaction to those judging the explanation. I will show that by analyzing properties of students’ underlying knowledge systems I can explain differences between individuals’ responses to similar instructional sequences, and account for processes of knowledge construction that take place as students reason through instructional analogies. I am currently engaged in exploring how the model and principles developed in this study can be appropriated to studying processes of mathematics thinking and learning.

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