Knowledge in Pieces: Theory and Methodology for Studying Learning

Andrea A diSessa
University of California, Berkeley

Over the last 30 years, I have developed an epistemological perspective on learning that now encompasses a reasonably-sized community of active researchers, who have developed a significant body of work—ranging from theoretical innovation concerning the nature of knowledge, to micro-analysis of students learning and curricular design. In this three-lecture series, I will try to motivate the point of view, illustrate it with recent research, and try to convey some of the theory and methodology that we use.

Talk 1 – 22/9/2015 – kl. 10-12 – Palaver Hall
I will first try to explain my point of view on intuitive knowledge and the challenges it poses to learning, but also—distinctively—the opportunities it affords for new learning trajectories, if we attend to it. I explain the nature of intuitive knowledge (sometimes called "misconceptions") as I see it, and illustrate some of its negative effects. But I will also illustrate the power one sometimes finds in intuitive knowledge for approaching science and mathematics. I will illustrate with a remarkable case study of how a group of students (about 16 years old) developed a cogent model of thermal equilibrium with scarcely any instruction at all. The analysis implicates intuitive elements of knowledge one-by-one, and challenges the common characterization of intuitive knowledge as "misconceptions" to be overcome.

Talk 2 – 24/9/2015 – kl. 10-12 – Palaver Hall
The second theoretical target will be to explain the "architecture" (organization of knowledge) of some scientific concepts, called the "coordination class model". This architecture outlines very particular learning difficulties, but also suggests productive pathways for learning. I will primarily use a case study of a student gradually learning mathematics, the law of large numbers, to illustrate several of the characteristics of coordination classes.

While presenting the case studies in each of the first two talks, I will illustrate (but not really explain) two fairly distinctive methodologies for doing this kind of work: at a small scale, *microgenetic analysis*; and at a larger scale, *design-based research*, which has become popular in the United States.

Talk 3 – 30/9/2015 – kl. 10-12 – Palaver Hall
Finally, I will: (1) broaden the scope and characterize the Knowledge in Pieces program as a whole, and (2) mention some other interesting recent studies, hint at how this perspective can illuminate many topics in physics, mathematics, but also other sciences, such as biology and chemistry.