WESTERN MICHIGAN UNIVERSITY

The Department of Chemistry Presents:

Dr. Nicole Becker

Department of Chemistry
Michigan State University

Title: Coordinating Consensus: How Student Dyads Achieve Multi-Representational Alignment in Thermodynamics Learning

Understanding thermodynamics in chemistry requires students to coordinate knowledge across phenomenological experiences, molecular-level processes, mathematical formalisms, and graphical representations. Using Coordination Class Theory (CCT) as an analytical framework, this study examines how undergraduate chemistry students negotiate meaning and achieve alignment while collaboratively solving thermodynamics problems involving specific heat, phase changes, and heating curves. We analyze a case study of two students enrolled in a second-semester general chemistry course collaboratively solving thermodynamics problems. Through qualitative discourse analysis, we identify multiple episodes of misalignment across representational contexts and trace the interactional processes through which students attempt to repair and re-coordinate their reasoning. Our analysis reveals that mathematical and graphical representations function as contexts requiring substantial alignment work. Conceptual progress emerges through changes in extraction strategies, including algebraic rearrangement of equations to align mathematical forms with graphical structures. This work reframes effective thermodynamics instruction around supporting alignment work by designing tasks and discourse practices that surface misalignments and provide students with opportunities to negotiate coherence across representations, time, and social interaction.

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