“Improving Student Learning in Physics: The dual roles of conceptual understanding and reasoning ability”

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Why do students make errors on physics problems? Errors that directly contradict what they have been taught? Errors that don’t arise from the failure to remember the correct formula? For the past several decades, physics education researchers have focused on one compelling explanation: students arrive in the classroom with pre-formed ideas about how the world works, which often win out. According to these accounts, students’ prior knowledge has been built through rational, if imperfect, processes of observation and analysis, and any new or different ideas presented in the classroom must likewise be built, not simply received. Figuring out what ideas students bring with them to the classroom has proven to be a complex, multi-faceted program of research that has significantly influenced physics teaching. However, students don’t always produce incorrect answers through logical inferences based on incorrect or inappropriate premises – often they don’t know why they chose a particular answer, just that it seems right. “Dual-process” theories suggest that their answers might not be based on so-called “slow” thinking, which is deliberate and laborious. Instead they might be based on so-called “fast” thinking, which is automatic and effortless. In this talk, I will show how fast thinking can mask students’ conceptual knowledge and discuss recent efforts to use dual-process theories as a basis for improving both conceptual understanding and reasoning skills.

Thursday, April 8, 2021
4:00 - 5:20PM

Talk will be via Zoom - contact physics@csus.edu for links

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