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**Promoting Conceptual Coherence in Quantum Learning through Computational Models**[1] HEE-SUN LEE[2], University of California, Santa Cruz — In order to explain phenomena at the quantum level, scientists use multiple representations in verbal, pictorial, mathematical, and computational forms. Conceptual coherence among these multiple representations is used as an analytical framework to describe student learning trajectories in quantum physics. A series of internet-based curriculum modules are designed to address topics in quantum mechanics, semiconductor physics, and nano-scale engineering applications. In these modules, students are engaged in inquiry-based activities situated in a highly interactive computational modeling environment. This study was conducted in an introductory level solid state physics course. Based on in-depth interviews with 13 students, methods for identifying conceptual coherence as a function of students' level of understanding are presented. Pre-post test comparisons of 20 students in the course indicate a statistically significant improvement in students' conceptual coherence of understanding quantum phenomena before and after the course, Effect Size = 1.29 SD. Additional analyses indicate that students who responded to the modules more coherently improved their conceptual coherence to a greater extent than those who did less to the modules after controlling for their course grades.

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