

Abstract Submitted  
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**Student use of model-based reasoning when troubleshooting an electronic circuit** HEATHER LEWANDOWSKI, Univ of Colorado - Boulder, MACKENZIE STETZER, KEVIN VAN DE BOGART , University of Maine, DIMITRI DOUNAS-FRAZER, Univ of Colorado - Boulder — Troubleshooting systems is an integral part of experimental physics in both research and educational settings. Accordingly, ability to troubleshoot is an important learning goal for undergraduate physics lab courses. We investigate students' model-based reasoning on a troubleshooting task using data collected in think-aloud interviews during which pairs of students from two institutions attempted to diagnose and repair a malfunctioning circuit. Our analysis scheme was informed by the Experimental Modeling Framework, which describes physicists' use of mathematical and conceptual models when reasoning about experimental systems. We show that system and subsystem models were crucial for the evaluation of repairs to the circuit and played an important role in some troubleshooting strategies. Finally, drawing on data from interviews with electronics instructors from a broad range of institution types, we outline recommendations for model-based approaches to teaching and learning troubleshooting skills.

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