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Re-thinking intro physics labs: Teaching and assessing critical thinking

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Taking a scientific approach to understanding and improving how we teach physics starts with figuring out what it is we are trying to measure and, therefore, what we are trying to teach. The goals of instructional lab courses have been highly debated for decades with not much research to back up either side. In this talk, I will describe new research into the efficacy of lab courses with different aims: from teaching conceptual physics to fostering critical thinking. I will demonstrate how new pedagogies are taking advantage of the unique affordances of labs to teach experimentation skills and critical thinking about data and models, without sacrificing learning traditional physics content.