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Evaluating instructional labs' use of deliberate practice to teach critical thinking skills

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The goals for lab instruction are receiving critical attention in the physics education community due to multiple reports and research findings. In this talk, we describe a theoretically-motivated scheme to evaluate instructional lab curricula and apply that scheme to three implementations of an electricity and magnetism lab curriculum: one that aimed to reinforce physics concepts (Semester 0) and two that aimed to teach critical thinking skills (Semesters 1 and 2). The scheme has three components: (1) that critical thinking is a context-dependent process for using critical thinking skills to make evidence-based decisions, (2) that to make decisions one must have agency, and (3) that deliberate practice can be used to effectively teach critical thinking skills. Our analysis shows that the Semesters 1 and 2 curricular designs effectively targeted experimentation-focused critical thinking skills but did not strongly align with theoretical recommendations for deliberate practice. For curriculum developers, instructors, and researchers who intend to teach critical thinking in the context of experimental physics, this scheme serves as a tool to create and evaluate lab instructions by measuring how specific skills are supported through deliberate practice.

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