

SCAFFOLDING LABORATORY SKILLS FOR FIRST-YEAR PHYSICS MAJORS

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One of the core utilities of a physics laboratory program is the acquisition and application of several core 'laboratory skills', such as accurate data logging, comparisons of theoretical and experimental data, and handling experimental uncertainties. Physics laboratory programs do not adequately reinforce content (Holmes et al., 2017), therefore, explicitly teaching laboratory skills is as vital as ever. At the University of New South Wales, we have a laboratory program for a small subset of physics students who intend to complete a physics major (approximately 60 of our yearly 1400). This small cohort offers a unique opportunity to efficiently implement adaptable interventions.

In this presentation, we outline the implementation and immediate effects of an explicit scaffolding intervention designed to improve students' uptake of laboratory skills. Laboratory skills are de-embedded from the laboratory manual and presented as separate learning modules that the students must progress through alongside their labs. The experiments themselves *reference* the learning modules but the *teaching* of the skills is now no longer done within the laboratory. Student laboratory submissions are also restructured to require explicit use of the relevant laboratory skills learned thus far.

By presenting the lab skills week-by-week (e.g., proper data taking one week, followed by graphing/curve fitting the following, then uncertainties, etc.), we intend to reduce the cognitive load on the students (Plass et al., 2010); before this intervention, students were confused and overwhelmed when asked to incorporate all the term's lab skills into each submission. We expect that explicit scaffolding of the laboratory skills as separate modules will improve students' focus on the weekly relevant laboratory skill and the transferability of their newly gained knowledge.

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