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Making Comparisons - A Strategy for Teaching Scientific Reasoning in a First Year Lab

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Recent work on first year labs at UBC have focussed on teaching students widely-applicable data handling skills: especially, understanding uncertainty, statistical tools, and graphical techniques. In the past year we have also targeted students' critical thinking, with a relatively simple framework that asks students to make quantitative comparisons, reflect on those comparisons, and then act on them. These iterative loops force students to improve their experiments and/or re-think the models they are testing. We have found that these expert behaviours become a habit-of-mind even after the explicit instructions to iterate are removed. More importantly we find that when combined with experiments that force them to confront problems with models, these iterative comparison loops lead to striking improvements in the quality of students' reflection on data and models. These gains are also found to transfer into their behaviour in second year, a striking instance of transfer.

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