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Machine learning analysis of student frames in open-structure lab courses REBECKAH FUSSELL, Cornell University, RUIJIE JIANG, SHUCHIN AERON, Tufts University, NATASHA HOLMES, Cornell University — Many physics departments have recently reformed their laboratory curricula to open up the lab structure in order to teach students more authentic research practices. Yet some students still expect to confirm a particular theory, and some expect to have a low level of decision-making agency as they plan their experiments. We study these expectations through the theoretical construct of frames, where a frame is defined as a person's stable set of expectations about the activity taking place. We identify evidence of different frames in student written coursework. These frames include *worksheet frame* (low decision-making agency, evidenced by a low degree of original experimental design ideas or justification and high overlap to the structure of the lab manual), *confirmation frame* (low epistemic agency, evidenced by arguments that focus on confirming a particular theoretical result), and *original investigation frame* (high epistemic and decision-making agency, evidenced by high degree of original argumentation and conclusion-making and independent and justified design ideas). We apply supervised and unsupervised machine learning methods to the students' written work to facilitate qualitative analysis and determine trends in student framing.

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