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Science, serendipity, and supervision in Maker Labs¹

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Engaging university students in scientific inquiry is integral to several learning goals in the natural sciences. However, encompassing everything from conception and design of experiments to mathematical modeling for interpretation of data, scientific inquiry is often dismissed as too difficult and/or resource intensive. Following recommendations in the pedagogical literature, we have designed and piloted a lab course devoted to fully open inquiries wherein our local (but not atypical) constraints led to choices for flipped-style instruction and utilization of accessible and affordable Maker equipment and resources. We describe the interdependencies of our chosen teaching methods and elaborate on the course design's serendipitous pandemic resilience: realizing student gains in competence and independence in navigating their empirical research cycles. We discuss how supporting experimental conception, design, and execution in a flipped-lab format transformed the roles of both students and lab instructors. We also discuss the benefits of devoting contact hours to reflection on, and iteration of, experimental design choices and to the non-trivial process of scientific sense-making. Additionally, we describe a faculty online learning community focusing on related teaching methods.

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