Using replication studies to teach research methods in cognitive science

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Overview

Some instructors of research methods classes are conducting authentic (i.e., publishable) replication studies with their classes (de Leeuw et al., 2018; Hartshorne et al., 2019; Hawkins et al., 2018; Leighton, Legate, LePine, Anderson, & Grahe, 2018; Wagge et al., 2019). This practice has, potentially, both pedagogical benefits for students and broader benefits for the scientific community (Frank & Saxe, 2012; Standing et al., 2014). Students experience an authentic research process from design through publication, providing opportunities for instruction on many different aspects of the research pipeline. When done with care, replications from the classroom become a valuable part of the scientific literature, and students fulfill an underserved role in science: performing direct replications (Everett & Earp, 2015).

Adding authentic replication work to a research methods class naturally raises many questions about pedagogy and implementation. What studies should be replicated? How can an appropriate sample for the replication be obtained, especially at small institutions? What can instructors do to ensure that students, who may be conducting research for the first time, are able to produce quality work that meets the standards of publication? What aspects of the research process should students contribute the most to, and what aspects should be controlled by the instructor?

There are many reasonable answers to these questions. With the growing adoption of replication studies in courses, a diverse set of classroom-tested approaches now exists. This creates the possibility for sharing, synthesizing, and improving teaching strategies, which is the goal of this workshop. This workshop brings together instructors who have conducted replication work with their research methods classes to discuss their successes and failures. These instructors have taught classes at the undergraduate and graduate level. Students in the classes have conducted behavioral studies (both in-lab and online) and EEG studies. The classes vary in structure (students may work as an entire class, in small groups, individually, or as part of a larger collaborative endeavor across many classes) and points of emphasis in the research process.

Workshop Structure

This is a half-day workshop. The first portion of the session will feature presentations from instructors (listed below) describing how replication studies have been utilized in their classes and how replication studies fit into the broader pedagogical goals of the class. In the second portion of the workshop, the presenters will discuss questions from the audience and a moderator in a panel format. Audience contributions to the discussion will be welcome.

Target Audience

The workshop welcomes anyone with an interest in teaching research methods, including both current instructors and students and postdocs who plan to teach research methods in the future. We hope that workshop attendees will leave with concrete ideas for how to incorporate replication work into their own research methods classes.

Presenters

Josh de Leeuw, Jan Andrews, & Ken Livingston (Vassar College) have co-taught undergraduate Research Methods in Cognitive Science. In their course, students begin the semester by conducting a replication study and then develop one or more novel follow-up experiments. They will discuss how conducting a replication prepares students to design and execute their own original research, and how

working with undergraduate students on drafting a manuscript for submission to a journal provides a different kind of opportunity for teaching scholarly writing.

Jordan Wagge (Avila University) is the Associate Director of the Collaborative Replications and Education Project (CREP), a project that promotes and scaffolds crowdsourced replication work through student research. She will discuss how CREP can support replication work in methods courses, including sample assignment guidelines for instructors who seek to incorporate CREP work into their courses.

Joshua Hartshorne (Boston College) has taught three iterations of his course Language Acquisition & Development. Although not a methods course, it contains a substantial lab component. Through a series of group projects, each class of approximately 10 students completes 5-6 replications. The presentation will discuss how to incorporate a lab component into a content class. It will also discuss how to use replications as a vehicle for teaching programming, statistics, and best practices.

Robert Hawkins (Stanford University) recently led a classroom replication effort as part of the graduate course "Lab in Experimental Methods". In this course, each student chooses a paper to replicate based on their own research interests and proceeds independently through a structured series of milestones with supervision from instructors. The presentation will discuss this pedagogical workflow, how the replication model can be adapted for students of different levels, and the challenges that arise in managing a wide diversity of projects.

Michael Franke (University of Osnabrück) has taught two classes that combine undergraduate/graduate levels with a dual focus: one on theoretical issues concerning reproducibility and open science, and another on conveying first practical experiences with behavioral experiments by means of a replication project. The courses required students to preregister their replication and make all analysis scripts available prior to data collection. The presentation will discuss the challenges and opportunities of making especially undergraduates appreciate solutions (e.g., preregistration & large-scale replications) to problems (e.g., abundant researcher degrees of freedom) they have not experienced first-hand yet.

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