Project Overview: A New Approach to Teaching General Psychology at CU
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Project Summary
This proposal describes a “flipped classroom” approach to teaching General Psychology, with the goal of promoting abstract and critical thinking, and laying the foundations for an evidence-based understanding of the world. Class time will be used for the guided completion of projects contributing to the construction of these cognitive skills. Projects will utilize various software packages that students will then use in many of their other classes in this and other departments, and will involve generating and testing hypotheses about cognition, emotion, and behavior. Students will gain skills in conducting literature reviews and questionnaire-based experiments, and get practice thinking systematically about their own hypotheses. The class will leverage the extensive expertise of faculty in The Department of Psychology and Neuroscience at CU, as well as professors from other departments who are affiliated with the Institute of Cognitive Science. Curriculum construction will involve creating digital video of these faculty lecturing on or discussing their domains of expertise. In this manner, students in the class will be exposed to a scientific approach to understanding the world from investigators at the forefront of their respective fields.

General Psychology (PSYC1001) is the gateway course to the Psychology Major which is offered within the Natural Science Division of the College of Arts and Sciences. The Psychology Major curriculum at the University of Colorado Boulder, has a primary focus on teaching students about the Scientific Study of the Mind with a heavy emphasis on the use of Scientific Methods in this pursuit. The General Psychology course, however, has historically been taught as a general introductory survey course. This proposed project is designed to empirically test a strategy that may transform the manner in which the Department of Psychology and Neuroscience teaches General Psychology. This new pedagogical approach may better instill at the outset a scientific foundation, perspective and associated investigative skills for University of Colorado students.

Background
Undergraduate education in the Department of Psychology and Neuroscience is generally successful, but as the most popular major in the College of Arts and Sciences, we serve a broad range of students. As is true across many majors, many fail to develop abstract and critical thinking skills, an important goal of an undergraduate education (e.g., Heiman, M. & Slomianko, 1987). More students who graduate should understand the experimental tradition and scientific manner of thinking that is foundational to the various subdisciplines of psychology, cognitive science, and neuroscience. Part of a solution may lie in the educational literature: an active learning approach to teaching General Psychology.

“Active learning” can refer generally to any educational approach in which students guide their own learning, instead of the more traditional model involving information transfer from teacher to student. People with advanced degrees in psychology usually take part in some manner in the
scientific investigation of cognition, emotion, and behavior, either in academia or in industry. Thus, active learning in a general psychology class should involve students systematically evaluating behavior. Active learning approaches to undergraduate education have been shown to be successful across a number of domains, including Psychology (Heiman & Horswill, 2002; Modell, 1996; Prince, 2004, Springer, Stanne, & Donovan, 1997; Yoder, & Hochevar, 2005.)

An increasingly popular approach to active learning in the undergraduate classroom involves the “flipped” classroom, in which class time is spent primarily in student-driven learning situations, such as group and individual projects (e.g., Bergmann & Sams, 2012; Tucker, 2012). This model does not rule out the use of lecture and testing in some cases, but for the most part, digitally recorded lectures are assigned as homework, with activities that would traditionally be assigned as “homework” taking place during class time.

The approach described here is likely to result in a number of desirable student learning outcomes. Here we propose a flipped general psychology class at CU, allowing active learning in the classroom. Various literatures suggest that an active learning approach in the general psychology classroom at CU will:

- cultivate critical and abstract learning in our students, high-level cognitive skills that are transferable to many situations.
- help students understand the subject matter in an evidence-based manner, evaluating what is presented rather than passively consuming it.
- allow instructors to guide students through the proper use of relevant software in testing their hypotheses.
- allow instructors to guide students in the development of literature review skills, including source evaluation, critical thinking, and the effective use of various search technologies.

The Curriculum
At CU, The Department of Psychology and Neuroscience, as well as the Institute of Cognitive Science, boasts a number of world-renowned experts on various specific topics, including learning, learning disabilities, memory, attention, cognitive control, pain, hormones, stress, emotion, meditation, the placebo effect, participation in healthy behaviors, cognitive development, and political decision making, among many others. Curriculum developers use a number of different sources for lectures within the flipped classroom model. In many cases, the instructor of record assigns their own lectures to their students. In other cases, instructors use publicly available lectures on topics of interest, from sources such as iTunes U and MIT Open Courseware. Taking advantage of the disparate expertise of the faculty in The Department of Psychology and Neuroscience will result in more compelling and up to date curriculum content than anything that could be created by a single individual. Furthermore, this content will expose students to a wide range of possible areas of focus within the general umbrella of “psychology”.

Because most of the time students are exposed to “lecture” is spent at home, class time can be used quite differently. For the first week, the instructor will explain the structure of the class and give a general overview of the different areas of psychology, cognitive science, and neuroscience. A traditional lecture format with a number of short activities and videos
interspersed throughout will be used. The second and third weeks will involve a similar structure, with a larger amount of class time devoted to activities, some based on the assigned video homework. The subject matter will include hypothesis testing and developing an evidence-based understanding of behavior, as opposed to an understanding based only on logic and conjecture. In the fourth week, students will begin group projects. After the fourth week, the beginning of each class will be focused on the content of assigned homework, with the second half of each class spent on group projects, generating ideas and materials.

This class structure will provide appropriate scaffolding for the development of the cognitive and practical skills needed for effective independent and guided learning. One midterm and one final test will be included, as well as two large projects - the first in groups of 4, the second in groups of 2. Student attendance will be tracked using Clicker answers during the first part of class each day. The class will be open to 100 students, and include one .5 TA, present during class.

**Curriculum Evaluation**
Three kinds of data will be collected in order to evaluate the efficacy of this pilot approach:
1. student grades in the class itself
2. student opinions
3. performance on a short exit exam (with no bearing on class grades)

These three types of data will be gathered from the 100 students in this class, as well as 100 control students sampled from across the other general psychology sections during same semester. Students’ opinions will be probed using an online questionnaire four times over the course of the semester. Grades on both projects and tests will be included as outcome measures as well. Finally, both the control and pilot students will be given the same exit exam, written together by the instructors of all psychology classes, intended to omit any specific subject matter taught in any of the classes. This short exam will instead evaluate student’s abstract and critical thinking ability, within the context of general psychology and experiment evaluation.

Data will be analyzed using hierarchical linear modeling (HLM). HLM is a form of statistical analysis that allows the estimation of effects of teacher and student separately, as well as very detailed analysis of change in performance or opinions over time. Students in the pilot and control classrooms will be matched using as many characteristics as are available, using a technique called propensity score matching, if possible. Propensity score matching avoids many of the pitfalls resulting from a lack of true random assignment to the conditions of an experiment by matching subjects on a number of dimensions.

**Project Impact**
If successful, this project could have a lasting impact on pedagogy in the Department of Psychology and Neuroscience. A great deal of interest in the design of the overall Psychology curriculum currently exists in the department. Various aspects of the design of the class can be
adopted within other curricular contexts as well, so the adoption of desirable aspects in the future can be modular - an instructor need not change everything they do. General psychology has been taught in more or less the same manner in our department for decades. Although this educational approach has been successful over the years, it is a model of convenience, often attributed to Frederick II of Prussia. Professors largely teach in the manner in which they are taught, perpetuating this model *ad infinitum*. The research conducted in the Department of Psychology and Neuroscience, as well as in the Institute of Cognitive Science, positions our department to develop evidence-based pedagogy, especially in teaching 1000- and 2000-level classes. Such a change could have a lasting impact on our students, starting them on a path to thinking scientifically from the beginning of their undergraduate careers.

The curriculum developed here can also inform curricular development in other departments on this and other campuses. I will present the findings from the evaluation, as well as the design of the class, in multiple forums on campus, as well as at conferences and other campuses. We will also publish any positive results in a peer-reviewed forum. Although this project specifically involves general psychology, the model could be applied to any introductory class in any department. Certain aspects of this proposed curriculum are already being used, or are going to be implemented in the near future. The Engineering School is planning a flipped classroom model in the fall for their large introductory class. Other STEM disciplines, such as Physics, have been taking advantage of active learning contexts with increasing frequency for many years. In the University’s Residential Academic Program, Dr. GeoffUrland is currently experimenting with a flipped classroom with a very small section of general psychology (~30), taking advantage of lectures available online. These other present and future models, available here on campus, will inform and be informed by the findings of this curriculum implementation and evaluation.

For myself, this funding would give me the time to develop this curriculum, including gathering the faculty videos. I plan to use at least most of the materials developed for this project whenever teaching General Psychology in the future. Furthermore, the materials could also be used for future continuing education version of the class, exposing an even larger audience to expertise offered by this department. It would also further my expertise in alternative educational methodology development and implementation, as well as program evaluation. The Director of Undergraduate Education in the Department of Psychology and Neuroscience, Dr. Spencer has agreed to help gather curricular materials, and serve as mentor during the implementation of the class. His years in the department and reputation as an excellent and interested educator will be invaluable in this project. My own experience as a researcher, educator, and consultant, as well as the coursework I’ve completed here at CU, put me in an ideal position to complete this curricular design and evaluation project. I’ve completed extensive coursework in education, psychology, and neuroscience, including educational evaluation and statistics. I also served as a high school science teacher, in a student-centered Boulder Valley School District program, before entering graduate school. In my second year of graduate school, I was the first math and science teacher in a private version of this paradigm, developing the math and science curricula for the school. As a graduate student, I’ve been the instructor of record for both lower- and upper-division classes, both Cognitive Psychology (Introduction to and Advanced Cognitive
Psychology). In the upper division class, I successfully implemented a number of student-centered educational strategies.

**Budget and Project Timeline**
The curriculum will be developed in Fall 2013. The class will be taught in Spring 2014. The evaluation will be complete by May 30
$5300 - Spring salary for one post-doctoral lecturer to teach the class, including the collection of digital video from department faculty
$4093.49 - Salary for one .5 TA, to assist the lecturer in the classroom.
$606.51 - Course Materials

**References**
Bergmann, J. & Sams, A. (2012). *Flip Your Classroom: Talk To Every Student In Every Class Every Day*. International Society For Technology In Education