

Creating Teachable Moments in a Research Methods Class

By Paul Atchley

Project Summary

A psychology professor addresses the challenges of teaching a large research methods course that doesn't have a separate lab component. Through the use of a workbook that reinforces course concepts, students are able to apply research methods to novel situations, thus expanding their overall understanding.

BACKGROUND

Psychology is the science of human behavior. As a science, we have a variety of methodological tools for measuring and quantifying human behavior and cognition. [Research Methods in Psychology \(PSYC 310\)](#) is designed to provide working knowledge of those tools, as well as encourage the application of scientific thinking to everyday, real-world issues. Thus, as outlined in the [course goals](#), successful completion of this course should result in students gaining the skills needed to evaluate scientific data and differentiate between science and pseudoscience.

PSYC 310 is a required course for KU's psychology major and is required for admission to about three quarters of the U.S. graduate programs in psychology. It is a junior level course, and in our current curriculum it is taken after statistics. A methods course is typically taught as a lecture course with lab sections. The size of the lecture course varies depending upon ins-titutional resources, but the lab sections are usually in the 20-30 student range.

When I arrived at KU, there was no research methods course. There were three advanced methods courses available, each with enrollments of 15-20 students maximum, but with 1200 majors, that meant the vast majority of students did not have a methods course when they graduated. The department quickly approved creation of a methods course when I proposed it, but there was a dilemma: There were not enough resources to use the model of a typical methods course with lecture and labs. Furthermore, there were not enough instructors to offer multiple lecture sections per semester. This meant that the class was going to enroll 200 or more students each semester.

There were several challenges inherent to the structure of this course. One of the challenges was the effective teaching of research methods without a lab. Another challenge was class size—because this course is required for all psychology majors, the class size is around 200 students per semester. Finally, it was a challenge to establish personal goals for my students: Should the course be structured such that it prepares students for graduate school, should the focus be on helping students learn to evaluate claims in the real world, or should the course balance those two goals simultaneously? Therefore, I have tried to use research examples that take place in everyday life, in an attempt to bridge those two goals.

IMPLEMENTATION

To address some of the challenges that I listed in the Background section, I have implemented several policies (see Policy Links) to encourage student participation and learning. In addition, I have created a workbook of assignments and reports for students, in an attempt to increase their experience with the application of research methods without the benefit of a separate lab section.

Workbook Assignments My philosophy for the [workbook](#) assignments is that student learning takes place during the discussion portion of the assignment. Higher levels of student work seem to prepare students to come to this discussion with more to say. Subjectively, student discussion during Spring 2007 seemed to be deeper and broader, meaning more students were able to take part in discussion. Objectively, one consequence of this was that we moved through lecture topics more slowly. A metric of increased discussion was the necessity to remove one chapter from the midterm section and move it to the second half of the course.

The initial goal of the assignments was to reinforce topics that had been covered in class during lecture. I thought that I could lecture, have students engage with the material, and then re-lecture in a new way using the assignment as a starting point. This technique generally worked, but in some cases where the material in the initial lecture was fairly simple, the re-lecture was not a great use of class time.

Analysis of Workbook Changes to Achieve Course Goals There have been three assignments that I have felt have not been very effective. These were “Library Research” (Assignment 4), “Developmental Designs” (Assignment 7), and “Correlational Designs” (Assignment 8). Each assignment supported a learning objective of the course, but the assignments all failed to generate meaningful class discussion, and therefore failed to provide teachable moments in class. As can be seen in the student ratings of the assignments from Fall 2006, it is particularly apparent that discussion was lacking in response to “Assignment 4: Library Research.”

These three assignments have been modified to increase their ability to support in-class discussion. An example of this is “Assignment 4: Library Research” (Click here for the [original](#) and [revised](#) versions of this assignment). For this class, the ability to access databases and evaluate information sources is very important, so deleting the assignment was not an option. The original version tied in with a research report, but that created difficulty when scheduling the assignment. My goal was to have students access on-line databases to support the research process in Report 1. What the assignment did not capture was evaluating science as presented in the popular press. It was also boring for the students and led to very low ratings of discussion on student feedback.

The assignment was modified by providing a common research topic for all students. In addition, the teaching assistants and I chose a topic that we hoped would generate interest among the students. To that end we picked an analysis of facilitated communication (FC). To add to student investment, I asked students to imagine themselves as clinicians making a recommendation to a parent. This capitalized on the heavy number of students who typically indicate interest in becoming clinicians or counselors. I also tied it back to the “Ways of Knowing” assignment by asking them to evaluate multiple sources of information and to gather information from library as well as popular sources. The students also would typically encounter a reputable university with a FC research center, requiring them to engage in a discussion of whether academia always

produces “objective” results. Finally, I asked them to consider issues of professionalism by including information on their professional societies’ view of FC.

As the student rating data reflect, this assignment led to MUCH more student discussion. What had been a ten-minute discussion now filled an entire class. I found the discussion was exceedingly rich in teachable moments and provided a view into the sort of complexities of information evaluation we would expect a good scientist to be able to tackle. This model was similarly used to redesign other assignments.

Policies

Mastery and Effort Description Info: Grade assignment is an important philosophical decision. It may reflect certification of skills learned, assessment of knowledge, or an award reflecting the quality of work. Students are keenly aware of grades and may often seem to be more concerned with grading than learning. Informing students that they learned a lot despite a poor grade is not going to satisfy them. From an instructor’s perspective, assigning a poor grade to a student who tests poorly but who is clearly sophisticated in his or her thinking about course content, or assigning a good grade to a student who memorizes well for an exam but who cannot demonstrate deep thinking about the course or is only in class at exam time, are both equally unsatisfying options.

The grading goal of PSYC 310 is to provide an accurate assessment of student understanding of research methodology. Grades can also reinforce behaviors I believe encourage learning. Grades are calculated based on test performance (mastery) and homework (effort). The former is designed to assess a student’s basic methodological knowledge and to his or her ability to apply it in a limited context (the exam). A student may be able to do this successfully but fail in a broader context, or may not perform optimally on the exam but can understand broader issues in research and methods. The effort grade is designed to reflect opportunities to place factual knowledge in a general context.

Exam (mastery) and homework (effort) grades are interactive. The final grade is a reflection of both components. A minimum level of performance in each is required for a particular grade. For example, absence of effort results in a lower grade even if expertise is high. And effort without expertise is similarly reflected in a lower final grade. My in-class explanation goes something like this: “If you perform less well on an exam that you feel reflects what you have really learned, but you are making an effort to apply your knowledge, you *will* learn, and I am comfortable certifying that you earned a final grade higher than reflected by your mastery. Similarly, if you just read the book and notes and do not attend class, and therefore do not do the assignments and demonstrate effort, I cannot certify a level of even average learning for this material.”

The specifics of the grading scheme are provided on the [syllabus](#). To summarize, students must have an overall percentage of work both on exams and homework to earn a grade on the same order as other courses (90% is an A, 80% is a B, etc.). However, exam performance can be lower (80% makes students eligible to earn an A) and brought to the overall criterion through the addition of effort points. Students must also do a certain amount of effort to be eligible for grades

as well; for example, earning an A as a final grade requires that they do 80% of the homework assignments and all of the research reports.

This grading scheme has two effects. First, it encourages students to attend class and complete assignments. I believe there is value in my lectures and in the examples that are generated via the interaction with students during feedback sessions about homework. For this reason, I require students to be present to turn in an assignment. I doubt students who memorize a book truly retain anything they learn, but students who provide their own examples and who can see the context of those examples in discussion, will retain that learning. Second, it provides a correction for lower exam grades. My exams are designed to be difficult to avoid ceiling effects in assessment and to help students see how deeply they grasp the material. However, there is a realistic requirement to provide students with the ability to achieve grades that are consistent with the expected norm. This is accomplished by allowing students to raise exam scores by demonstrating effort.

Attendance Info: My philosophy on attendance is that I cannot teach a student who is not present. Attendance is not required, unless students wish to earn a grade that certifies they have learned something. I do not have a section on attendance in my syllabus. However, I strongly encourage attendance in a few different ways, using course assignments as the hook. Assignments are 50% of the course grade. I absolutely do NOT provide a calendar of assignment due dates. In my course, students must be present to turn in assignments. I explain to the class that the real learning for an assignment is during class discussion of the assignment, not in simply doing it, so I cannot certify that they have learned anything if they simply have someone drop off their assignment, send it to me via email, or turn it in late. I have an assignment workbook, but I frequently modify assignments in class as a function of class discussion. Students must do the modified assignments. I give students one late assignment option so they can turn in one assignment late on the last class day, no questions asked.

I believe a grade is meant to reflect what a student has learned in a course. Part of this is exhibited in the ability of a student to perform on an exam. However, I also feel that if I have developed good assignments, and students do those assignments and attend the lecture discussing the assignments, they will learn, even if their exam performance does not reflect memorization. I strongly feel that attending class is critical for learning and thus have my assignments set up in a way to maximize this. First, I do not announce in advance when assignments will be due. Informal tracking in the first few years of this methods course showed that attendance waxed and waned with assignment due dates. When students only show up to turn in an assignment, they miss the context and purpose of it. I discourage this by only assigning homework as it is relevant for the course. This also meets the goal of making assignments relevant to the class discussion because they come at an appropriate time. A second aspect of encouraging attendance is that assignments can change as a function of class discussion, as discussed above. The added value from an attendance standpoint is that a student must come to lecture to get the assignment that will be due. I stress to students that the learning I am certifying with a grade is a function of being present when an assignment is discussed, in addition to actually doing the assignment.

Pass/Fail Grading Info: Assignments and reports are graded on a pass/fail basis. These are viewed as gateways to further learning, not the learning outcome themselves. Thus, these

assignments may lead to learning in class, rather than reflect what has been learned, making non-pass/fail grading less appropriate. The original intent of the pass/fail system of grading was to 1) minimize a student's focus on the "right" answer and instead encourage exploration and thoughtful discussion and 2) minimize instructor workload for a large section with little assistant support. The system has generally worked, but over time we have modified it to improve student performance.

In the first version of the grading system, there were "pass", "fail" and "bonus" points available. "Bonus" was for assignments of clearly high effort. Students that did two assignments of bonus quality were given the option of not turning in one assignment later. Of course, the students that had bonus assignments were also those that would generally do all of the assignments anyway, so this was not a great motivator for them. The hope was to bring up the work of the middle range of student, though there was no evidence this occurred. This grading option has now been eliminated.

The "pass/fail" option does lead to some near-failure assignments that are still graded as "passing". To reduce this, we have more recently begun mining work from previous semesters for examples of excellent and failing work. These are posted when an assignment is made, and students are told that if their work models poor assignments, they will fail. A GTA in the Spring semester of 2007 who also served as a GTA in the Fall of 2006 [reports](#) that there has been a substantial reduction in failing work as a result. In addition, more students have done work at an excellent level of performance.

Overall Class Performance—Analysis of Mastery and Effort Structure: Mark Chan, PSYC 310 GTA, reports: *"Having had the opportunity to TA PSYC 310 for 2 semesters, has given me the opportunity to witness improvement in the way our students approach their homework assignments. Prior to giving students examples of good and bad homework assignments, as was the case in the first semester, students would engage their assignments with minimal effort. With the introduction of positive and negative examples of assignments this semester, students tend to give clearer answers, often elaborating to support their decisions. This in turn also further enhances lecture discussions as students would be more prepared to speak up, having had the opportunity to critically think about their answers."*

STUDENT PERFORMANCE

Overall Class Performance—Analysis of Mastery and Effort Structure I was interested in assessing the relative influences of mastery grades, as assessed by exams, and effort grades, as assessed by homework assignments, on overall student performance. (For a detailed description of the mastery and effort policy, see the [Policy Links](#) section). The interaction of effort and mastery grades was analyzed for a recent 450 student sample (one fall, one spring and two summer sections). Only students who completed the course were included. [Click here](#) for results of this analysis. A few observations are worth noting:

- The mastery grades closely matched the final grades overall (within 3% points), suggesting the use of effort and mastery-based points does not inflate or deflate the grade significantly.
- Students seemed to be performing at a very high rate of effort. Almost two-thirds of the class reached an A level of effort. Almost 85% of the class was at an A or B level of effort.
- There were a small number of cases (9.1%) where mastery performance exceeded effort performance and led to a reduced grade from mastery grades alone. In most cases, effort led to an increase in a student's final grade (53.1%) or matched his or her exam performance (37.8%).

Assessment of Assignment Performance I have provided several examples of student work on Assignment 3—the [Ethics Assignment](#)—below and at right. This assignment asks students to attempt to redesign the Milgram experiment in an ethical way. The goal is to get across the idea of cost/benefit analysis of science: We learned a lot about human behavior from the Milgram experiment, but we did so at a cost. To achieve this goal, students must analyze what was unethical with the experiment, what the experiment taught us, and try to balance cost and benefit in a new experiment. There is no way to actually “correctly” complete this assignment. I allude to this when I tell students about this assignment, explaining that they are graded on a pass/fail basis, not for a correct answer but for the thoughtfulness of their work. Students find this incredibly challenging and a bit frustrating, but the ratings of the assignment are generally very high. The discussion portion of this assignment takes approximately 30-40 minutes and makes the concept of cost/benefit in psychological research very clear.

Strong Examples: The strong examples all share some common features (see [Strong Example 1](#), [Strong Example 2](#), [Strong Example 3](#), and [Strong Example 4](#)). First, they address each of the parts of the assignment. As we will see in the weak examples, some students fail to complete the full assignment. Second, they provide a level of detail that clearly demonstrates the student understands the material. The weak examples are often brief because students either do not know the answer or they are trying to disguise that fact with brevity. Third, they are simply well-written.

Weak Example 1: The responses in this example are obviously quite brief. There is not enough detail in the answers to items 1 and 2. Also, a new design idea is referenced but it is not fully described, and the remaining items for this assignment were not completed.

Weak Example 2: Again, a greater level of detail overall would be required to achieve the goal of this assignment. There is no outline of an alternate design and therefore no analysis of the ethical implications and effectiveness of the new design.

Weak Example 3: It is clear that the questions are not fully answered in this example and that more information needs to be included to demonstrate thoughtful consideration of the assignment, as well as to provide explanations that would clarify the responses that are present.

Weak Example 4: This example has several problems. First, it is incomplete since it does not answer all the items required for the assignment. Second, the “new” experiment suggested was either not different from the Milgram experiment or was simply not explained in a way that showed how it was different and why it was more ethically acceptable.

Milgram Experiment In the Milgram experiment, Stanley Milgram tested the degree to which a person would obey an authority; in this case the authority figure was the experimenter. In the experiment, a participant (the teacher) was required to deliver electrical shocks to another person (the learner) for failing to remember words, to a strong enough voltage that the learner appeared incapacitated. Though the participant did not know it, the shocks were not real and the learner worked for Milgram. Milgram found about 2/3 of his teachers were willing to comply with the request of the authority to continue to shock the learner, even after the learner seemed debilitated.

REFLECTIONS

Overview I am happy with the overall construction of the course. Give the limits of the course (large class size and no labs), the integration of the workbook assignments and the use of the assignments to emphasize and teach important points works well. The grading scheme is perceived as fair and the analysis indicates it is not inflating grades, and that the high rate of compliance for effort-based points is getting students to class and offering me an opportunity to teach them.

Course changes since developing this portfolio The biggest course changes center on the mastery points. One major issue students raised was the concentration of mastery points in two exams. I also felt that I was not doing enough to encourage the use of out of class time toward mastery. So, to address both of these issues, I have begun using the Blackboard quiz environment to present quizzes of the chapters before the lecture portion in class. These quizzes account for 20% of the mastery grade. They can be taken to criterion (multiple attempts). The contribution of the midterm and final exam toward mastery has been reduced accordingly. This change went into effect in Spring 2008 and I will monitor it to see how it influences the final grades.

Workbook I am not always happy with the timing of giving assignments. Course lectures ebb and flow with student questions and with feedback in class that indicates the need to cover topics with more depth or to capitalize on student interest. This leads to awkward assignment timing. For example, I like to have the reports due after a weekend, so that students have time to complete the many steps required. However, we are not always ready to assign something at the end of the week given where we are in lecture, and assigning it the following week would lead to the assignment occurring after the lectures on that topic have finished. Thus, it is not always the case that these assignments have led to teachable moments, but generally they have succeeded to some extent. The following assignments have generally been very successful: “ways of knowing”, “my life plan,” “ethics,” “identifying confounds” and “factorial designs.” Success is defined by the amount of discussion the assignment generates, the subjective quality of student work, and the ability of the assignment to lead to “teachable moments” in class.

Assignments that were less successful included “library research,” developmental designs” and “correlational designs.” These three assignments shared a common flaw: they were to unstructured. As discussed in the “Implementation” section, this has been changed by adding additional structure to the assignments by using examples for the whole class to evaluate, rather than having each student generate their own example. And to improve on the ability of the assignments to generate discussion, the examples are designed to approach moderately controversial topics. On the whole, these changes have worked very well.

Future Directions I would like to do more demonstration-based projects in class. A number of concepts can be demonstrated with web-based examples that have been developed by other instructors. I have started to search for more examples to add this semester, but it requires a re-update each time the class is taught as content becomes unavailable. For example, in the section on correlations I have found a very nice “restriction of range” [online demo](#) by David Lane that provides a much more clear way to teach that concept than simple lecture.

I would like to integrate clickers in the course to facilitate in class quizzes and polling for student learning. This is a big step requiring a major overhaul of the course, and one which I am reticent to take on at this time. I have approached this via the soft option of doing more in class assignments in which student performance is collected and assigned effort points. This requires students to generate answers rather than nod their heads that they understand. I have discovered (not to my surprise) that students often cannot generate answers to concepts they are certain they understand. The clickers can do this more immediately, but are limited to multiple-choice responses. I intend to do more in-class performance assignments next semester. Having done a few this semester, however, I can already see that it will take much more time and that I may need to reduce the overall content in class and move more to out of class study.