

## *Focusing on How We Know What We Know in the Psychology Classroom<sup>1</sup>*

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(This essay originally appeared as the monthly "E-xcellence in Teaching" e-column in the PsychTeacher Electronic Discussion List for June 2002.)

Students enjoy learning the facts of psychology—what causes mental illness, why there are gender differences in some domains and not in others, what factors we use in making decisions, how memory works, and so on. The only trouble is that the facts of psychology are actually few and far between. Rather than providing definitive answers, we are often only in the position to provide suggestive evidence or theories, complete with their limitations and alternative explanations. Students often express surprise and frustration with the dearth of "facts" psychology instructors are able to provide. Even after taking a research methods course, students also often seem to have little genuine understanding of the process by which those facts or hypotheses about the mind and behavior are acquired.

Clearly, it is an instructor's mission to convey what we know about a particular topic or domain of study within the field. However, another central aspect of our job as instructors is to impress upon students the challenges involved in inferring information about human thought and behavior. Even more importantly, it is our responsibility to impart to students an understanding of the process by which such information may be gleaned. Understanding this process contributes to students' ability to evaluate critically and reason about evidence more generally. This is fundamental not only to their understanding of course content, but also to their ability to contribute to society as a critical consumer of information. From voting to making medical decisions to choosing to play the lottery, an understanding of how we know what we know and how to assess the strengths and limitations of research will put students in good stead to make careful, informed, and well reasoned decisions.

Unfortunately, humans are notoriously poor at the logical inference that underlies scientific reasoning. This became evident to me as early as my senior year in college when I served as a teaching assistant for an introductory logic class. Daily, I observed students' struggles with what was, for them, a highly unintuitive process. As I continued my training in cognitive psychology, I learned about the empirical evidence confirming that humans reason by example, by heuristics, and with strong biases that do not conform to the rules of logic. Unfortunately, the heuristics and biases employed in people's everyday lives have very real and often very negative consequences. We, as psychology instructors, have a unique opportunity and responsibility to cultivate critical reasoning skills that contribute to students' understanding of the scientific inquiry into the mind.

But how do we do this? How do we motivate students to care about how we know as well as what we know? How do we improve students' ability to critique study designs, evaluate evidence, draw logical conclusions, and generate alternative explanations? Here are some classroom activities that I have found useful in facilitating student engagement in the scientific process:

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<sup>1</sup> Namy, L. L. (2003). Focusing on how we know what we know in the psychology classroom. In W. Buskist, V. Hevern, & G. W. Hill, IV, (Eds.). *Essays from e-xcellence in teaching, 2002* (Chap. 7). Retrieved [insert date] from the Society for the Teaching of Psychology Web site: <http://teachpsych.lemoyne.edu/teachpsych/eit/index.html>

1. I require students to read, discuss, and write about primary sources. There is nothing like delving in to the intricacies of an experimental report to provide students with concrete evidence of the process by which psychological evidence is acquired (and of their own lack of understanding of this process). Textbooks are designed to provide an overview and synthesis of the relevant material, but they often do so at the expense of details about the design, logic, and often, the actual findings. Primary sources serve as an important alternative perspective on course content. Students find primary sources challenging to understand and will need a lot of guidance and scaffolding. However, over the course of a semester, students can develop some clear skills in reading and synthesizing articles for themselves.

Many textbook publishers now sell "current readings" anthologies that provide reasonably short, non-technical articles clustering around a particular theme. Consider augmenting your textbook assignments with such readings. I provide at least one article reading assignment for every topic discussed in class, and strategically incorporate that reading into the lecture at an appropriate place. Students are expected to answer questions about the goals, methods, findings, and conclusions of the paper either during class discussion or in a short written summary. Learning to articulate (both orally and in writing) a research article's goals, approaches, and findings goes a long way toward training students to evaluate evidence critically.

2. I expect students in my classes to know and be able to answer "Namy's Five Questions." For every experiment discussed in class, students must be able to answer these five questions. Students are warned that these questions are fair game on the exams covering any of the experiments or studies discussed in class. The five questions are:

- What was the question that this study was designed to answer?
- What was the experimental design?
- What is the logic of how the design answers the question?
- What were the results?
- What were the conclusions?

Are these questions earth-shatteringly insightful? Unique? Of course not. However, they provide a context and a structure for students' knowledge bases. I have found that asking students to be sure they can deconstruct an experiment into these five parts has dramatically increased the depth of their understanding of the experiments discussed in class (as well as their subsequent test performance). Students engage the material in a more science-minded fashion and most impressively, begin to identify and rectify holes in their own understanding. When I began using "Namy's Five Questions," students suddenly began raising their hands in class to ask me questions such as "Can you go over the logic of study X again?" and started e-mailing me prior to exams to ask "Can you clarify the conclusions of study Y?" or "I don't understand the main question in experiment Z." When students are expected to understand the process and are given the tools to do so, they become more active participants in their own learning. They become more focused on the intricacies of the experiments, not just the bottom line.

3. I provide in-class experiments and demonstrations whenever possible, or (when feasible) require students to collect their own data. I encourage students to make predictions about the outcomes of experiments, propose extensions to the experiments we discuss, and even generate research proposals of their own. These sorts of activities provide a personal involvement on the part of the student (as subject or prospective experimenter) that generates an interest in the outcome of the experiment and an investment in the motivation for and interpretation of the study. This experience gives students a heightened level of insight into the phenomena and the process of conducting

research. One of the most valuable aspects of designing or conducting an experiment of their own is that students must make their own judgments and decisions about how to measure, collect, organize, and present the data. Because they make these decisions for themselves, they experience with great vividness the sometimes subjective nature of experimental design, coding, and analysis. This process can drive home for them why definitive answers are often sparse in science.

In summary, these activities are designed to encourage students to analyze the logic of studies, evaluate evidence, and articulate their ideas both orally and in writing. None are terribly difficult to implement but they do involve a slight shift in focus during lectures and in readings and paper assignments. I am convinced that these activities increase students' understanding of and appreciation for the process of studying the human mind and behavior. These skills will serve students beyond the classroom, ensuring that they are more thoughtful consumers of information in their everyday lives. This is the best possible legacy that we can provide for our students.