

- Gleitman, H. (1995). *Psychology* (4th ed.). New York: Norton.
- Gray, P. (1994). *Psychology* (2nd ed.). New York: Worth.
- Griggs, R. A., & Jackson, S. L. (1989). The introductory psychology textbook market: Perceptions of authors and editors. *Teaching of Psychology*, 16, 61-64.
- Griggs, R. A., Jackson, S. L., & Napolitano, T. J. (1994). Brief introductory textbooks: An objective analysis. *Teaching of Psychology*, 21, 136-140.
- Myers, D. G. (1995). *Psychology* (4th ed.). New York: Worth.
- Quereshi, M. Y. (1993). The contents of introductory psychology textbooks: A follow-up. *Teaching of Psychology*, 20, 218-222.
- Weiten, W., & Wight, R. D. (1992). Portraits of a discipline: An examination of introductory psychology textbooks in America. In A. E. Puente, J. R. Matthews, & C. L. Brewer (Eds.), *Teaching of psychology in America: A history* (pp. 453-504). Washington, DC: American Psychological Association.

Notes

1. This article is based on a presentation by the second author at the meeting of the Southeastern Psychological Association, New Orleans, LA, March 30-April 2, 1994.
2. Correspondence concerning this article should be sent to William Buskist, Department of Psychology, 226 Thach Hall, Auburn University, AL 36849-5214.

Taking a Course in Research Methods Improves Reasoning About Real-Life Events

Scott W. VanderStoep
Calvin College

John J. Shaughnessy
Hope College

We examined the extent to which students who take a course in research methods improve their reasoning about real-life events. Because social science majors improve their methodological and statistical reasoning during 4 years of college (Lehman & Nisbett, 1990), a logical source of this improvement in psychology would be the Research Methods course. We tested students in Research Methods and in Developmental Psychology on methodological and statistical reasoning at the beginning and the end of the term. As expected, reasoning scores of Research Methods students improved more than did scores of Developmental Psychology students. These results have implications for teaching because they support our intuitive notions that what we are teaching has real-life value.

Teachers get excited when students recognize the relevance of what they are taught to something outside the classroom. We are pleased when students tell us that what they learned in our class helped them with some other aspect of their lives or that our class taught them to think like a psychologist. Likewise, we are disappointed when students simply memorize factual information without reflecting on its relevance or when they fail to see even the most obvious examples of the applicability of course material to new situations.

What students take away from psychology courses will depend on the course. In developmental psychology, for example, students may reflect on their own childhood and how it has made them who they are, they may see how the course material can make them better parents, or they may learn how to deal more effectively with aging parents and grandparents. Each content course in psychology has such real-life applications.

What do students take away from a research methods course? We hope they learn how to conduct psychological research, including the mechanics of experimental design, survey sampling, and data analysis. Beyond learning how to conduct research, however, research methods has the potential for teaching students real-life thinking and reasoning skills that may be useful in various settings.

The ability to reason methodologically and statistically is a domain-general cognitive activity that students can transfer to a variety of contexts (Nisbett, Fong, Lehman, & Cheng, 1987). Furthermore, instruction has been shown to improve students' methodological and statistical reasoning. Specifically, undergraduates who majored in social science disciplines showed greater improvements in methodological and statistical reasoning than either natural science majors or humanities majors (Lehman & Nisbett, 1990). We expected, at least among psychology courses, that research methods would explain a large part of the change in methodological and statistical reasoning. Thus, we tested whether taking a research methods course would improve reasoning more than another undergraduate course, Developmental Psychology.

Method

Participants

Participants were students enrolled in two sections of Research Methods and two sections of Developmental Psychology at Hope College. The two sections of Research Methods were taught by different instructors; the two sections of Developmental Psychology were taught by a third instructor. The second author was the instructor for one of the Research Methods courses. Thirty-one students from the Research Methods classes and 32 students from the Developmental Psychology classes took the pretest and the posttest. Most were traditional-age college students. Most students were women (78%), although no gender differences were found in reasoning scores (see Results). The mean American College Test (ACT) composite score of incoming students at this institution is 24, and the mean high school grade point average is 3.4.

Instrument

Each form of the instrument for measuring reasoning contained seven items; three items involved statistical reasoning, and four items involved methodological reasoning. Two forms were used and were counterbalanced across pretest and posttest. Some of the items were modified versions of those used by Lehman and Nisbett (1990), and others were created for this study. The statistical reasoning questions tested whether students could recognize examples of regression to the mean

and the law of large numbers when applied to everyday events. The methodological reasoning items tested whether students recognized concepts such as a spurious causal relation and selection bias. All items were phrased in everyday language with no reference to methodological or statistical concepts. The scenarios were followed by four or five alternatives that might explain the event. Although all responses were plausible explanations, we agreed that one response best illustrated methodological and statistical reasoning. Participants' scores could range from 0 to 7 based on how many correct answers were selected. A question illustrating a spurious causal relation is as follows:

Suppose it were discovered that students who majored in math, engineering, or computer science scored higher on tests measuring "problem-solving" ability at the end of 4 years of college than did students who did not major in these fields. How would you interpret this information?

- a. Physical science training has positive effects that improve complex reasoning ability.
- b. Math, engineering, and computer science majors have more class assignments that require students to use complex reasoning.
- c. Physical science majors may differ on many other things besides problem-solving ability, and they would have scored higher at the beginning of their freshman year as well.
- d. It is likely that physical science students will score lower on tests of *verbal* ability.

Answer c demonstrates that the relation between selection of major and future problem-solving skill may not be causal based only on the evidence provided (i.e., no pretest scores).

Procedure

We administered the instrument to students in their classrooms on the second day of the semester and again near the end of the semester. Students were told that the stories were similar to events they might read about in a newspaper or encounter in everyday conversation.

Results

Pretest and posttest means were calculated for the number of correct responses on the seven methodological and statistical reasoning items for the two courses. There were no gender differences, $t(61) = 1.01, p = .275$, and no between-instructor differences for the Research Methods instructors, $t(29) = 1.10, p = .28$, in methodological and statistical reasoning.

The means from the seven-item instrument (see Figure 1) for the Developmental Psychology students were 2.38 at pretest and 2.84 at posttest. The means for the Research Methods students were 3.0 at pretest and 4.97 at posttest.

Using change scores as the dependent variable, Research Methods students showed greater improvement than Developmental Psychology students, $t(61) = 3.62, p = .002$. When

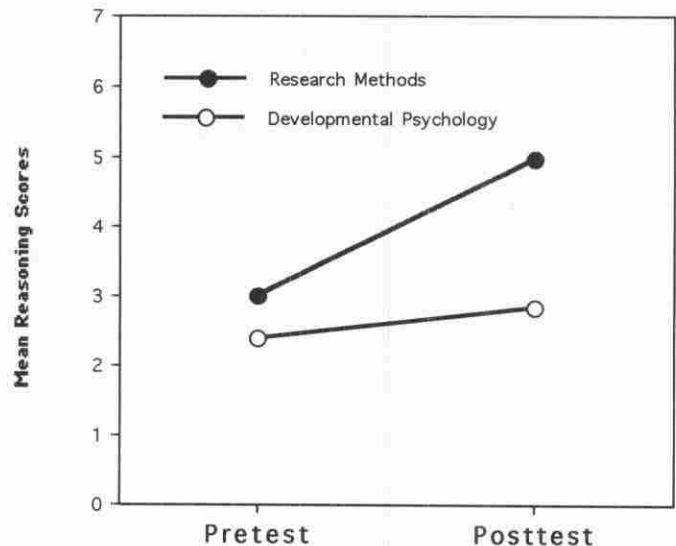


Figure 1. Mean scores for students in the two courses.

the four methodological reasoning items were analyzed separately, greater improvement was again found for Research Methods students, $t(61) = 3.02, p = .004$. However, the effect was not present when the statistical reasoning items were analyzed separately, $t(61) = 1.52, p = .13$, although the change scores were in the same direction. This result suggests that the effect is produced by the change in students' methodological reasoning scores.

Also, we found that the number of psychology courses taken was a significant predictor of posttest methodological and statistical reasoning scores, $\beta = .28, t(61) = 2.28, p = .026$. To assess the relative contribution of the Research Methods course while accounting for the variance explained by the number of courses taken, we conducted an analysis of covariance (ANCOVA). The ANCOVA indicated a significant effect for course, $F(1, 60) = 11.6, p = .001$, suggesting that there is an effect of taking Research Methods on reasoning beyond that accounted for by the number of psychology courses taken.

Discussion

Our study extends work by Lehman and Nisbett (1990) on the effects of undergraduate education on student reasoning. Whereas Lehman and Nisbett found long-term effects of certain courses, we found more specifically that a course in methodology can be important in cultivating students' ability to think critically about real-life events.

General reasoning skills are important, especially when information is modified and updated very rapidly. For example, a student taking social psychology in 1996 will be learning very different material than a student who took the course in 1970. We do not know what tomorrow's domain-specific knowledge will be or whether what we are teaching today will still be relevant in the future. However, if we can teach students to develop general thinking skills, then the importance and relevance of our courses will be greater. If psychology majors can be taught general skills that they can apply to novel domains, we can better ensure the relevance of what we

teach. Students taking research methods classes may not remember the precise definition of a confounding variable or how exactly to design a randomized blocks experiment. However, our results suggest that they may leave with some general skills that they can use while watching the evening news, shopping for automobiles, voting, or deciding whether to adopt a new weight-loss technique that they saw advertised.

As psychology instructors, we have intuitive notions about the usefulness of the skills we teach our students. We talk confidently about the benefits of an undergraduate major in psychology and how "thinking like a psychologist" helps students in many areas of life. Our results suggest that there is value in learning to think like a psychologist. There is more to real-life thinking than is represented by our small set of items, but we are pleased that our intuitions held up to empirical scrutiny.

References

- Lehman, D. R., & Nisbett, R. E. (1990). A longitudinal study of the effects of undergraduate training on reasoning. *Developmental Psychology, 26*, 952-960.
- Nisbett, R. E., Fong, G. T., Lehman, D. R., & Cheng, P. W. (1987). Teaching reasoning. *Science, 238*, 625-631.

Notes

1. We thank Jim Motiff and Jane Dickie for the use of their classroom time.
2. Correspondence concerning this article should be sent to Scott W. VanderStoep, Department of Psychology, Calvin College, 3201 Burton SE, Grand Rapids, MI 49546; e-mail: svstoep@calvin.edu.

Self-Knowledge as an Outcome of Application Journal Keeping in Social Psychology

Stuart Miller
Towson State University

Students enrolled in Social Psychology kept application journals, in which they applied course concepts to their daily social experiences. A content analysis of the entries revealed evidence of the acquisition of 12 possible forms of self-knowledge, defined by applying each of 4 cognitive operations (labeling, explaining, educating consequences, and self-assessing) to each of 3 different aspects of the self (thoughts, feelings, and actions). This analysis provides instructors with a framework for assessing various dimensions of an important component of student psychosocial development: understanding the self.

I (Miller, 1993) had students in an undergraduate course in social psychology keep journals that described the application of concepts from that course to their daily social experi-

ences. I (Miller, 1994) found that these journals could facilitate the learning of social psychological principles and provide evidence of psychosocial growth in students during the semester. Thus, a content analysis of the journal entries revealed various cognitive, emotional, and behavioral changes concerning the self, others, and broader social issues.

Among other things, students acquired increased knowledge of the self as a result of the self-reflective process stimulated by this form of journal keeping. Forty-seven percent of the journal entries in the course contained descriptions of some new piece of information that students learned about their behavior or experiences (Miller, 1994). Journal entries generated by students in one of the sections I reported were subjected to a qualitative analysis to determine the type of self-knowledge students obtained by relating social psychological concepts to personal social experiences.

Method

In Spring 1992, 26 students at Towson State University took a junior-level course in social psychology in which several representative topics were covered in depth. Students learned about social cognition, diversity, relationships, prosocial behavior, and social influence.

Students were prepared for the journal assignment by practicing the application of social psychological concepts and theories in small classroom groups. For example, students were given several real-world examples of the operation of a particular principle before being asked to share their own examples with group members. The groups reported their examples to the class and received feedback on their work. If necessary, students were asked to repeat this exercise to improve their application skills. For the journals, students were asked to engage in a similar process by (a) selecting any concept from the topics covered in the course, (b) describing an experience from their daily lives that involved the operation of this concept, and (c) showing specifically how the experience and the course concept were related. Students were required to make at least one application journal entry per week.

Of the 403 entries turned in by the class, 207 of them (an average of 8.0 per student) provided evidence of *self-knowledge*, defined as the acquisition of new insights (from course-relevant material) about the nature, determinants, or consequences of one's thoughts, feelings, or actions (Miller, 1994). Journal entries were examined further by classifying them according to type of knowledge. The aspects of the self that students described in their entries fell into three categories: thoughts (cognitive), feelings (emotional), and actions (behavioral). In addition, students applied the following four cognitive operations to these components of the self: (a) They attached learned social psychological labels to their experiences, (b) they engaged in explanation by discovering antecedents of their experiences, (c) they made inferences about the consequences of their experiences, and (d) they engaged in a self-assessment of their strengths and weaknesses.

Thus, a 3×4 system of classification, yielding 12 forms of self-knowledge, was used to describe the journal entries. Students labeled, explained, educated consequences of, or self-assessed their thoughts, feelings, or actions.