Mar 8th, 4:00 PM - 5:45 PM

Improving the Experimental Design of SoTL Research

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Recommended Citation
Marsh, Patricia; Gopala, Neena; and Dickherber, Anna, "Improving the Experimental Design of SoTL Research" (2012). SoTL Commons Conference. 57.
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Improving the Experimental Design of SoTL Research

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Abstract

Limitations in previous pseudo-experimentally designed Scholarship of Teaching and Learning studies were addressed by including recent recommendations in the literature (LoSchiavo, Shatz, & Poling, 2008, Smith, 2008). These involved: (a) pre/post tests administered in Social Psychology (SP) courses; (b) random assignment of SP students within the same course, semester, and instructor to one of the two interventions, and (c) the recruitment of students from a participant pool to serve as a control group (i.e., completed the same tests without having taken the course). This presentation focused on results from a 50-item SP exam covering SP topics, including prejudice, aggression, attraction and learning behavior. Students’ scores were compared between those randomly assigned to one of two experimental groups (n = 35) vs. the control group (n = 44). Students in the experimental conditions performed significantly better on the exam than those in the control group (n = 35) vs. the control group (n = 44). Students in the experimental conditions performed significantly better on the exam than those in the control group (n = 35) vs. the control group (n = 44).

An example reflecting this observation was conducted by Marsh and Harrington (2010), in which two learning strategies (experimental groups) were compared across sections of Social Psychology. Students (N = 87) enrolled in three different semesters, but taught by the same professor, completed either self-referenced journal writing assignments (2-3 items per each of the four chapters) or repeated quizzes (50 items four separate times). Scores on the first two exams did not differ across the two learning techniques or across the semesters; the study only addressed the first half of the textbook. Such findings might suggest that either strategy (or classroom intervention) was effective in helping students learn about social psychology. However, a major limitation or flaw was that lack of a control group. This and other SoTL studies raise the question: How are teaching faculty members to bridge the gap between what they do within individualized “logical, deliberate … systematically” crafted projects and the steps necessary to transition into the world of scholarship of teaching and learning (SoTL)?

Proposing solutions to this question, LoSchiavo, Shatz, and Poling (2008) discuss a variety of experimentally designed ways to address the limitations within the SoTL literature; namely the shortcomings of quasi-experimental research designs. They recommend strategies such as randomly assigning students to sections of undergraduate psychology classes or randomly assigning students within the same course to the different conditions. To incorporate the comparison or control groups as urged by several in the field (e.g., Jackson, 2009; Smith, 2008), LoSchiavo et al. (2008) suggest that professors create wait lists or utilize “volunteer systems (i.e., participant pools)” (p. 302) as creative means of forming such control groups when more experimentally designed controls are not feasible.

Applying these recommendations, Dickerher and Dragoo (2011) incorporated a control group (n = 36) that consisted of participants not enrolled in a social psychology course and not exposed to the learning techniques of repeated examination or self-referencing. Their experimental group (only repeated quizzes) consisted of students (n = 57) enrolled in Social Psychology during the 2010-2011 academic year. Students in both groups completed the same Exam 1 (Marsh & Harrington, 2010). Students in the experimental group scored significantly higher than those in the control, large effect sizes (Cohen’s d = 2.0) were also reported.

Because there was no difference between the repeated quizzes and self-referenced journal writing strategies in the previous (Marsh & Harrington, 2010) research, Dickerher and Dragoo’s findings imply that both learning strategies might be equally effective in the classroom. But such conclusions are risky given the limitations associated with quasi-experimental research designs (LoSchiavo et al., 2008).

The current study attempted to simultaneously apply the randomization-and-participant control group recommendation from LoSchiavo et al. (2008).

The format of the current study should help others who wish to learn:

(a) From the wisdom gained from others conducting similar forms of scholarship;
(b) How to expand their own “scholarly teaching (Richlin, 2001)” endeavors into the SoTL domain (as cited in Smith, 2008, p. 263); and
(c) How to initiate a more experimentally rigorous research design before, during, or after their classroom (field) research is conducted.

Method

Participants

Students enrolled at a mid-sized university in the Midwest participated in one of two experimental conditions during spring 2011 as part of the department’s assessment efforts (n = 35) were recruited from the department’s participant pool to fall in 2011 to serve as the control group, those in the control group were reduced (from n = 44 to n = 38), because I had already completed a social psychology course and two did not complete the exam.

Control Group  Experimental Groups (n = 35)

<table>
<thead>
<tr>
<th>[Participant Pool]</th>
<th>Self-referencing</th>
<th>Repeated Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n = 38)</td>
<td>(n = 18)</td>
<td>(n = 17)</td>
</tr>
</tbody>
</table>

Women: 32 (84%) 26 (74%)
Employed: 17 (45%) 23 (71%)
High previous degree (e.g., AA or AS): 2 (5%) 6 (17%)
Year in school: FR/SO: 29 (76%) 1 (3%)
JR/SR: 8 (21%) 33 (94%)
Did not answer: 1 (3%) 1 (3%)

Note: There was no statistical difference in exam scores between the two experimental groups, therefore they were combined for the analyses with the control group.

Materials

Unit 3 Content & Exam 3

• Chapters from Myers 9th ed. (2008) were: Prejudice, aggression, attraction, and helping behavior.
• 50-item Exam: 45 multiple-choice and 5 true/false items.
• Self-referenced Essays (20 items; a.k.a. journal entries)
• Five questions per chapter due once a week (some due date at the quizzes).
• Directions: TYPE your responses either in the journal application in Blackboard or in Word then attach the file to the journal application in Blackboard. In most cases you are to use complete sentences when responding to the questions (index otherwise indicated). These questions are intended to help you gain a more in-depth understanding of the course material, therefore the responses are to be at least 5 sentences long per numbered item.
• Sample item: Provide a definition for group-serving bias. Present two examples of group-serving bias. How might you prevent this from occurring? Are there any techniques you have learned from Social Psychology that could aid you in recognizing and preventing this from occurring? Explain.

Repeated Quizzes

• 50 items per quiz (see Marsh & Harrington, 2010 for details on the creation of these quizzes).
• 4 quizzes within the unit; 200 items total for the unit.
• Each quiz had 20 items from the chapter being covered, and 10 items each from the other chapters in the unit. For example, the third quiz in the unit contained 20 items from the attraction chapter, and 10 items each from the remaining chapters (prejudice, aggression, and helping behavior).

Demographic Items and Other Self-Assessments

• Selected demographic items are displayed under Participants. Data from the other self-assessment measures were not presented in this particular study.

Procedure

Experimental Groups

• By the end of the first week of class, after enrollments had stabilized, students were randomly assigned to the self-referenced written essays (journal entries) or to the repeated quizzes.
• Blackboard NGS was used to setup these randomized groups and links to the essays or quizzes were setup with restricted access. Students could only complete what they were randomly assigned to.
• All had the same instructor, assignments, and exams.
• Essays or quizzes had the same due date; approximately one every 1 to 1.5 weeks.
• Exam 3 was completed in one room with all students during the second week in April.
• Students received an informed statement describe that data were being collected for internal reporting purposes (e.g., accreditation and program review reports) and that some data may also be used for external purposes such as presentations or publications.

Control Group

• Flyers and announcements within the SORA system (experiment management system) were used to recruit students from the participant pool. The two restrictions were 18 years or older AND never been enrolled in social psychology.
• Students completed all aspects of the study through an online survey-test combination. The Qualtrics program was used to build the survey and collect the data.
• Participants read a consent form before clicking to agree and initiate the survey-test online packet. They received a debriefing screen when finished.
• Participants completed the same 50-item Exam 3 as the students in the Experimental groups.

Results

The univariate analysis showed that students in the experimental groups (M = 38.37, SD = 4.94) significantly outperformed students in the control group (M = 23.87, SD = 6.57) by an average of 15 points, F(1, 71) = 112.04, p < .001, partial eta squared = .61, and observed power = .100.

Discussion & Recommendations

The following are a few helpful recommendations for improving the “experimental rigor” of one’s teaching scholarship. The best advice is, certainly, to plan ahead and incorporate “control/comparison condition” before one collects data from the student population.

• The current study, along with past research on learning within social psychology courses, has provided stronger evidence that two different learning strategies may be equally effective.
• In other words, we are more convinced about the active involvement of students and the repeated assessments (quizzes and journal entires) that will help them retain more information from our classes. This greater confidence is due in a large part to the “improved experimental rigor” provided by the addition of a control group and the use of random assignment for students enrolled in the same course.
• From this experience, the authors learned that SoTL research offers more flexibility than traditional research designs, in which control elements can be added before, during, or after data are collected and analyzed from one’s courses.

Recommendations

The following are a few helpful recommendations for improving the “experimental rigor” of one’s teaching scholarship. The best advice is, certainly, to plan ahead and incorporate “control/comparison condition” before one collects data from the student population.

• Identify which “control/comparison group” options work best for your situation: 4. Baseline
• Assign control group in the fall, experimental group in the spring, then reverse the pattern the second year.
• Assign the control and experimental groups to different sections within the same semester.
• Randomly assign students to class sections.
• Use a colleague’s course (which may be a pre-requisite for your course) as the comparison group.
• Randomly assign students (within the same course) to the different conditions.
• Utilize convenient samples such as those from a participant pool, freshmen level courses (both inside and outside your department).