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Cemetery demography as a tool for teaching psychological research methods to undergraduate students[1]

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Abstract

Students enrolled in an honors introductory psychology course completed a cemetery demography project intended to stimulate student interest and appreciation for psychological research. They generated hypotheses about human population characteristics, collected cemetery data, tested their hypotheses with means comparisons, and wrote about their study in APA format. Responses on a satisfaction survey completed by students at the end of the semester support the conclusion that the cemetery demography class research project facilitated students' interest and appreciation for psychological research.

Cemetery demography, the study of human demographic patterns as indicated by information inscribed on tombstones (Flood, 1993), has been used in ecological studies of human populations (Jimenez & Cossman, 2006), group identity (Mant & Lovell, 2012), and changes in societal norms (Abel, 2008). In the present paper, we describe a cemetery demography project that we found to be a useful, experiential learning opportunity for honors students enrolled in a freshman-level, introduction to psychology course. Cemetery data may be appropriate for beginning researchers because they are easy to collect and readily amenable to simple hypothesis testing.

The novelty of cemetery data may stimulate students' curiosity and interest (Silvia, 2008), while research in the field may provide meaningful, first-hand understanding of the research process beyond lecture and textbook material. As opposed to an *information transfer* teaching approach (Boyer, 1990), where students passively receive and memorize coursework material, student-involved research promotes active learning (Bonwell & Eison, 1991) from a *transformational teaching* approach (Slavich & Zimbardo, 2012). Transformational teaching facilitates learning through student problem-solving, personalized feedback, collaborative relationships, modeling, and mastery experiences. These transformational teaching characteristics are often associated with greater learner satisfaction and learning outcomes (Norbert, Carter, & Varela, 2009). Student-led research gives students opportunities to accumulate modeling and mastery experiences in collaborative problem solving. Coordinated peer engagement may improve learning through students' own repeated articulations of various, alternative explanations (Smith, Wood, Adams, Wieman, Knight, Guild, *et al*., 2009).

Furthermore, the cemetery research project meets some of the American Psychological Association's (APA, 2013) guidelines for teaching research to undergraduate psychology majors. The project requirement to generate and test theoretically plausible hypotheses and make conclusions based on tests of field data meet APA learning outcomes 2.1 ("Use scientific reasoning to interpret psychological phenomena," p. 15) and 2.2 ("Demonstrate psychology information literacy," p. 15). The cemetery project is particularly relevant for outcome 2.4, which encourages students to "interpret, design, and conduct basic psychological research" (p. 15). The hypothesis was that the cemetery research project would facilitate students' interest and appreciation for psychological research.

Method

Participants

Eighty-three freshmen students enrolled in three sections of an honors introduction to psychology course at a large, Midwestern university were invited to voluntarily

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complete a survey concerning their experience of the cemetery research project. One of the students did not complete the survey, leaving 82 cases for analysis.

Measures

We constructed a satisfaction survey intended to measure student interest and appreciation for psychological research as a consequence of their experience of the cemetery research project. The 5-item survey employed 5-point Likert-type response scales (1: Strongly disagree, 5: Strongly agree). Although we were not concerned with the construct validity of the questionnaire, items reliably captured a meaningful element of students' perceptions about their learning experience ($\alpha = 0.83$). A prompt at the end of the survey invited students to "write any other observations or comments about how you may have benefitted from doing this exercise." Written directions on the survey reiterated that participation would not affect students' final grade in the course and that confidentiality would strictly be maintained. Identifying information was not recorded.

Procedure

The cemetery project commenced in two phases—hypothesis generation and data collection—and culminated in manuscripts in APA format (American Psychological Association, 2010). Students were introduced to the research project with a general overview that utilized the following ideas, either directly quoted or paraphrased: "Over the past century, the role of women in America has changed dramatically. Although the most salient historic event may have been the achievement of voting rights in 1920, a great deal of change has taken place in women's roles in the family, education, research, government, business, athletics, etc., as well as in women's lives in general. These changes have also affected the lives of men, either directly or indirectly through the changes in women's lives."

The class was then told that they were going to examine some of these changes by utilizing a readily available but untapped data source: cemeteries. Student pairs were required to generate four hypotheses based on this general theoretical statement. One hypothesis had to address age differences between wife and husband (e.g., birth dates for husbands preceded birth dates for wives), one hypothesis had to address differences between two eras (pre-1962 and post-1962, i.e., within the past 50 yr. and the 50+ yr. prior—e.g., life span is greater for males and females within the past 50 yr. than for the 50 yr. prior), one hypothesis had to address differences between three cemetery location types (rural, town, city—e.g., there are more unmarried adults in cities than in towns and rural areas), and one hypothesis had to address the interaction between any two of the previous variables (e.g., husband and wife age differences are smaller within the past 50 yr. than for the 50 yr. prior). Hypotheses above and beyond these minimum requirements were encouraged, and students were required to provide a short theoretical explanation for each of their hypotheses. The instructor then evaluated each team's hypotheses with respect to (a) whether they met the criteria listed above, (b) whether they were testable using the data to be collected, and (c) the plausibility of the theoretical explanations provided.

In the data collection phase, students were asked to visit any two of the following three cemetery location types: rural (a cemetery outside city or town limits), small town (population less than 50,000), or large city (population over 100,000). At minimum, each student pair was required to record the following data: year of birth and death on graves of 40 married couples (20 per visited cemetery), and from among those 20 couples, identification of 10 couples that died before the end of 1962, and 10 couples that died after 1962.

Each student pair then submitted their data on an electronic spreadsheet to their respective instructors. The instructor then combined all of the data into a single spreadsheet (available by request from the first author), and removed duplicate entries and entries that were clearly made in error (e.g., an individual's death date preceded his or her birth date). These collated and cleaned data were then distributed to the students. A brief student tutorial demonstrated electronic spreadsheet data sorting (e.g., into historical era or location type) and mean values calculations. Along with the data, students were given instructions on how to write brief research reports in APA style. They were told that they could use inferential statistics if they knew how to use them, but that a simple descriptive comparison of means was sufficient. Students wrote reports in pairs.

There were two primary requirements in the research reports. The first was the use of appropriate data to test each hypothesis and to report each test properly in the Results section. Students were required to submit a graph to illustrate the data they used to test each hypothesis (typically, mean score comparisons). The second focus was to interpret the data in the Discussion section with regard to the hypotheses and the theoretical explanations from which they had been derived. The following written instructions were given here:

1. Discuss your results in relation to each of your *hypotheses*. Discuss how your results either did or did not support your hypotheses.
2. Discuss your results in relation to each of your *theoretical explanations*.
3. If a given hypothesis ***was*** supported, present at least one alternative explanation (i.e., a different theory) **that is consistent with the results you found**.
4. If a given hypothesis ***was not*** supported, present an alternative explanation (i.e., a different theory) **that is consistent with the results you found**.

Course instructors invited students to complete a satisfaction survey at the end of the semester. Instructors told students that participation was voluntary, could be revoked at any time, and would not affect their grades. To maintain confidentiality, students were instructed to fold their survey forms and pass them to the front of the classroom whether or not they completed them. Accordingly, instructors could not know who completed or did not complete the surveys. No identifying information was recorded. The Institutional Review Board (IRB) affiliated with the university where this study was conducted approved study procedures.

Analysis

In order to test the hypothesis that the cemetery project facilitated students' interest and appreciation for psychological research, we first conducted one-sample *t* tests, with Holm-Bonferroni alpha correction for multiple *post hoc* comparisons (Holm, 1979), of overall mean ratings for scale items against the rating scale mid-point of 3. Second, we conducted a repeated-measures analysis of variance (ANOVA), with multiple comparisons *t* tests and Holm-Bonferroni alpha correction for *post hoc* comparisons, to assess whether participants responded differently between items. Third, we analyzed 34 student (41.46%) answers to the open-ended prompt after removing one response ("group project exercise") due to fact that the answer did not meaningfully address the prompt. The first and second authors independently coded responses according to valence and content. Upon the first sort, valence ratings were the same for 33 out of the 34 items (97.14%), and content ratings were the same for 34 code words and dissimilar for 17 code words (66.67% agreement). After independent sorting, raters met to reconcile coding differences.

Results

Participants rated all six items significantly greater than the scale's mid-point. Students rated Item 5 ("I took time to deeply reflect on the nature of our findings when writing up the research report") least favorably ($M=3.66$, $SD=0.98$). *Post hoc* analysis of a significant model ($F_{5, 405}=12.79$, $p<.001$, $\eta^2=0.07$), indicated that students rated Item 5 significantly less than all of the other items except for Item 6 ("I found this exercise an interesting, hands-on way to learn about the scientific research process"). Students rated Item 4 ("I felt like this exercise helped me to think about alternative explanations, i.e., there may be more than one explanation for how the results of a research study turn out") most favorably ($M=4.39$, $SD=0.81$). Item 4 was favored significantly more than all items except for Item 6. Descriptive statistics and item response comparisons with the survey midpoint value are available in Table 1. Within-survey, post-hoc comparisons of item responses are available in Table 2.

In response to the open-ended survey prompt, twenty-four students (70.59%) reported positive experiences, four students (11.76%) reported negative experiences, and seven students (20.59%) reported mixed (both positive and negative) experiences. The most frequently reported positive responses addressed the hands-on nature of the project ($n=10$; 29.41%). The most frequently reported negative responses addressed difficulty with securing transportation to and from cemeteries ($n=4$; 11.76%). Coded frequencies and percentages are available in Table 3.

Discussion

Overall, the vast majority of students reported positive experiences with the cemetery project. All scale items were endorsed in a significantly positive direction, indicating students' satisfaction with every element addressed by the questionnaire. The most favored item in particular suggested the students' widespread belief that the project aided their appreciation for alternative explanations of research study results. The least favored item suggested that students may not have reflected much

TABLE 1

One-sample *t* Tests For Item Mean Ratings and Mid-point Comparisons on the Cemetery Demography Project Survey ($N=82$)

Items	*M*	*SD*	*t*	Cohen's *d*
Q1. I thought about this activity on occasions other than when we were discussing it in class.	3.99	0.85	10.48†	2.33
Q2. I thought that this project helped me to better understand the steps involved in the scientific research process.	4.01	0.79	11.55†	2.57
Q3. I felt like this exercise helped me to think critically and analytically about generating and testing hypotheses.	4.29	0.81	14.47†	3.22
Q4. I felt like this exercise helped me to think about alternative explanations, i.e., there may be more than one explanation for how the results of a research study turn out.	4.39	0.75	16.80†	3.73
Q5. I took time to deeply reflect on the nature of our findings when writing up the research report.	3.66	0.98	6.06†	1.35
Q6. I found this exercise an interesting, hands-on way to learn about the scientific research process.	4.00	1.07	8.50†	1.89

Note. 5-point rating scale. Holm-Bonferroni alpha correction for two-tailed *t* test. *$p<.05$. †$p<.01$.

TABLE 2
Post Hoc Analyses of Within-subjects ANOVA Using Paired Samples *t* Tests

Comparisons	Mean Diff.	*t*	Cohen's *d*
Q1-Q2	−0.024	−0.23	−0.02
Q1-Q3	−0.305	−2.98†	−0.36
Q1-Q4	−0.402	−3.99†	−0.50
Q1-Q5	0.329	3.21†	0.36
Q1-Q6	−0.012	−0.10	−0.01
Q2-Q3	−0.280	−3.68†	−0.35
Q2-Q4	−0.378	−4.22†	−0.49
Q2-Q5	0.354	3.02†	0.39
Q2-Q6	0.012	0.13	0.01
Q3-Q4	−0.098	−1.38	0.13
Q3-Q5	0.634	6.05†	0.70
Q3-Q6	0.293	2.96†	0.31
Q4-Q5	0.732	6.93†	0.83
Q4-Q6	0.390	3.61†	0.42
Q5-Q6	−0.341	−2.67†	−0.33

Note. Holm-Bonferroni alpha correction for two-tailed *t* test. *$p < .05$. †$p < .01$.

TABLE 3
Coded Frequencies of Response Types For the Open-ended Prompt

	Frequency	Percent
Positive		
Direct experience	10	29.41%
Enjoyable	6	17.65%
Research process	4	17.65%
Interesting	5	14.71%
Social	5	14.71%
Critical thought	4	11.76%
Writing	3	8.82%
Novelty	2	5.88%
Negative		
Transportation	4	11.76%
Inconvenience	2	5.88%
Heavy workload	2	5.88%

when engaging in other components of the research process, such as hypothesis generation or data collection.

While results generally supported the notion that the cemetery demography project was a worthwhile class endeavor, there are limitations. The limited number of items on the questionnaire did not represent all experiential aspects of the research process. The open-ended survey item that prompted students to write about perceived benefits may have influenced respondents to neglect mention of negative experiences. Since one-group posttest designs are not especially robust against threats to validity, we considered comparing participants' survey results to control group endorsement on a similar survey. However, we concluded that comparison of the current sample to a group of students who either completed no research project or who completed a different research project would be meaningless. We also considered pre- and post-test measures, but we reasoned that students' experiences and perceptions of the scientific research process would necessarily change over time whether or not they had participated in the cemetery demography project. Finally, the sample consisted of honors students, and it is unknown if results of the present study extend to the general population of college students.

Although the project offered several opportunities such as hands-on research experience, novelty, data availability, and simple hypothesis testing, it also came with a few procedural difficulties. Management and coordination of large classrooms of undergraduate research novices was sometimes challenging. A few students reported difficulty securing reliable transportation to and from cemetery sites, and some students reported that the workload was too heavy. For instructional use of this cemetery project, we recommend that instructors provide students with explicit instructions, a checklist, and consultation during the writing process. Despite design limitations and project challenges, results support the conclusion that the cemetery project facilitated student interest and appreciation for psychological research. Future investigations exploring experiential class project effects on learning for the general college student population are indicated to demonstrate that our project approach increases students' knowledge of social scientific research as well as their interest and appreciation.

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