

Integrating Research Methods & Introductory Statistics

Cathy A. Grover and Kenneth A. Weaver

Emporia State University

McGovern, Furumoto, Halpern, Kimble, and McKeachie's (1991) reflection on undergraduate education in psychology offered eight common curriculum goals. One goal was to develop research methods and statistical skills, and "these skills should be fostered in separate courses" (p. 601). Their four curriculum models all included statistics and research methods as separate courses. Brewer et al.'s (1993) report on curriculum from the deliberations of the 1991 National Conference on Enhancing the Quality of Undergraduate Education in Psychology cited six specific curriculum goals. "Students receiving a bachelor's degree in psychology should have knowledge of statistics, research design, and psychometric methods" (p. 170). Perlman and McCann (1999) reported the statistics and research methods/experimental courses along with introductory, and a capstone experience were the top four most frequently cited courses among all undergraduate psychology courses. American Psychological Association Task Force on Psychology Major Competencies (2007) proposed 10 goals for the undergraduate psychology major and Goal 2 is "Research Methods in Psychology," which includes research design, data analysis, and interpretation.

The Rationale for Change at Emporia State University

Statistics and research methods courses are important and ubiquitous in undergraduate psychology curricula. Until the fall of 2003, the undergraduate psychology curriculum at Emporia State University included these two courses. However, starting with the fall 2003 semester, the content of the two courses was integrated into a two-semester sequence including Descriptive Research Methods and Statistics in Psychology PY300 and Experimental Research Methods and Inferential Statistics in Psychology PY301.

The change was the result of two years of deliberation about the undergraduate psychology curriculum that instituted several major changes. The

rationale for changing from the separate Statistics and Experimental Psychology courses to the integrated sequence was based primarily on faculty wanting to provide more support for majors required to do a research project in the Experimental Psychology course. The support provided in the integrated sequence included providing students more time to develop their ideas and having students complete a correlational study. Second, assessment data showed the retention and usability of the statistics content knowledge in the research methods course was not as high as the faculty expected and desired. Based on several tenets of cognitive psychology (e.g., semantic elaboration, Craik & Lockhart, 1972), the faculty concluded that the meaningfulness of the content knowledge of both courses would increase if research methods were presented with their accompanying statistical procedures.

Descriptive Research Methods and Statistics in Psychology (PY300)

The faculty designed the PY300 course to introduce students to descriptive methodology and statistics used in psychology. Because the instructor uses low level, easy-to-read textbooks (Davis & Smith, 2005; Weaver, 2005), with lots of student research as examples, the PY300 instructor does not use traditional lecture in most classes after the first few chapters. Rather, students must read the assigned material prior to class, as they need the text information to complete activities during class. Students must also own a copy of the current *Publication Manual of the American Psychological Association* (American Psychological Association, 2001). Reading the assignments prior to class is quite challenging at first, but the need is quickly apparent, and once students begin, it becomes habit for most. Additionally, exams cover all the reading assignments even when there has been no formal lecture over the material. After coverage of hypotheses and theory, non-experimental research methods, ethics in psychological research, American

Psychological Association (APA) format and scientific writing, how to use PsycINFO, and descriptive statistical analyses, including measures of central tendency and variation, and APA format and scientific writing, students begin their small group correlational study.

At our institution, collecting data to present only within class is considered a class activity, not research, and therefore does not need to be reviewed by the Institutional Review Board (IRB). In groups of 4-6, students in PY300 design a mock correlational study. First, during a single class period, each group decides on what two variables they think are related to one another, and that they can collect data via survey questions/items. The faculty do not allow students to use variables that might be sensitive or reveal confidential information (e.g., GPA, sexual preferences, medical illness).

Given that most of these students only have completed Introductory and Developmental Psychology classes, they frequently need help deciding on two variables. The use of Undergraduate Teaching Assistants (UTAs) during this early class period is especially helpful, as each UTA can help a small group and the instructor can circulate among the groups asking and answering questions as needed. UTAs are students who recently completed this course with an A or B+, possess good social skills, and accept the instructor's invitation to be an UTA. Next, group members must each find five journal article abstracts related to their study topics, and members work together both in and out of class writing an introduction using just the abstract information. By only working with the abstracts, students quickly realize how difficult writing an introduction is. Learning this lesson now encourages students to read the full articles for their PY301 experimental projects.

Students must also work together to develop their surveys, which after receiving the instructor's approval, class members complete anonymously. Perhaps one of the most difficult tasks for the instructor is to not tell students what changes to make to their surveys so that their project "works," and rather let them make mistakes. The reward comes when during their presentation, they acknowledge that more careful wording would have been clearer to their classmates. This process allows the instructor the opportunity to emphasize the importance of piloting their experimental study in PY301.

Once all the surveys are complete, the instructor gives a tutorial in how to do a correlational analysis in Excel and SPSS, after which groups perform their analyses. Groups must meet outside of class to write their study as a brief APA-formatted manuscript. Meantime, the instructor has students manually

computing correlations on smaller data sets in class, and also gives tutorials over making scatterplots, writing results in APA format, and developing PowerPoint slides. Finally, each group gives a 15-20 minute oral presentation and the group submits one final paper.

Because this course is a prerequisite for Experimental Research and Inferential Statistics in Psychology (PY301), students develop experimental research ideas and hypotheses in the first four weeks of the PY300 class. With intermittent prodding by the instructor, students perform their literature search, type their references in APA format, obtain and read a minimum of seven research articles, and write summaries of those articles. Having the students complete the references page(s) of their experimental proposal and submit summaries of their articles prior to the end of the PY300 course discourages procrastination; as rough drafts of their introductions are due the first week of the PY301 course. During the last three to four class periods of PY300, the instructor begins coverage of the basics of experimentation.

Experimental Research Methods and Inferential Statistics in Psychology (PY301)

Two objectives of the PY301 course are to develop an understanding and appreciation for the necessity and difficulty of systematically studying behavior and mental processes, and to prepare for intelligently scrutinizing explanations of behavior provided by psychologists, friends, the media and others. During this course, students learn about experimental designs and the appropriate inferential and non-parametric tests for the different designs and types of data collected. They use the same textbooks as in the previous course, and class time primarily continues to consist of hands-on activities. The "simple true" experimental project for this course includes preparation of an APA-formatted proposal submitted to the IRB, data collection, data analysis with SPSS, an APA-formatted final manuscript (after multiple rough drafts of each section), a PowerPoint presentation to the class, and a poster presentation at the department-wide Student Research Symposium and Luncheon that concludes each semester.

The syllabus for this course includes guidelines addressing each section of the proposal, as well as for the sections of the final manuscript. For a copy of the syllabi for these courses, go to <http://www.emporia.edu/~groverca/>. Included in the guidelines are the page numbers for related information in the APA publication manual. The

department keeps two copies of the publication manual in the classroom where several computers are also available to students. Additionally, students are required to adhere to the department writing standards as described in the handbook on the department web page, which can be found at: (<http://www.emporia.edu/psyspe/documents.htm>).

Students submit rough drafts of each section of the proposal separately, and the instructor returns them to students in the subsequent class.

The biggest challenge with the sequence is dealing with transfer students who have completed either a statistics or research course, but not both, at their previous institution. These students must be required to enroll in both PY300 and PY301 because of the extensive overlap. From the faculty's perspective, students can never get too much of either research methods or statistics, but students tend to have a different opinion. Thus far, once convinced, those transfer students who have taken PY300 and PY301 have indicated they are glad they have had to do so.

The benefits to this approach include students completing correlational and experimental studies, writing two research papers in APA format, and presenting orally to their peers and in poster format to the department. Faculty comment that students seem better prepared for conducting more advanced projects as independent research and/or the research option of the senior internship (PY490; see department web page for internship handbook). The stand-alone Statistics course (PY520) is taught as an elective, and early feedback for students who have completed the PY300 and PY301 sequence and then take PY520 is that the lower level courses provide an excellent foundation for the statistics course. By integrating the research methods with their statistical procedures, students now complete all of the steps and stages of a simple true experiment with extended time for development of ideas and faculty support to foster application and retention of the information.

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