Teaching the Foundations of Psychological Science

Basic Research Methods and Statistics

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Abstract

In this chapter, we detail a number of considerations for teachers of research methods and statistics courses at the undergraduate level, particularly introductory courses on these topics. In particular, we provide a rationale for why students need to learn the information in these courses, address challenges we as teachers face in teaching this information, and provide suggestions for overcoming these challenges and turning them into opportunities for students to understand the importance of this material. We also provide ideas for organizing the material in each of these two courses, discuss the benefits and pitfalls of teaching this material in an integrated course sequence, and highlight resources to help teachers teach this difficult material.

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Introduction

There has been a marked increase in global conversations about teaching psychology (Cranney & Dunn, 2011; Hanna, 2013). Finding optimal ways to teach students research methods and statistics in particular is a large part of the global conversation in higher education (Allen & Baughman, 2016; Roberts, 2016; Roberts & Allen, 2012; Sümer, 2016). In the United States, the American Psychological Association's (APA) Guidelines for the Undergraduate major (*Guidelines 2.0,* APA, 2013) and the National Standards for High School Psychology (APA, 2012) both stress the importance of research design and statistical knowledge and ability and provide useful language for shaping a focus on these two areas. The *Guidelines 2.0* lists "scientific inquiry and critical thinking," as one of the learning goals for an undergraduate psychology degree. Similarly, scientific inquiry is one of seven domains of the *Standards* for secondary education (APA, 2012). To accomplish this goal of fostering scientific inquiry and critical thinking ability requires, "the development of scientific reasoning and problem solving, including effective research methods," "applying research design principles to drawing conclusions about psychological phenomena," and "designing and executing research plans" (APA, 2013, p. 15).

Knowledge of basic research methods and statistical concepts are also foundational elements of the introductory psychology course (Gurung et al. 2016) and are featured explicitly in new student learning outcomes for the course developed for global implementation (APA, 2019). Consequently, research methods and statistics courses are the bedrock of education in psychological science (Dunn et al. 2010). Both courses hold a prominent position in the undergraduate psychology curriculum in the United States. Nearly every undergraduate psychology program offers introductory-level research methods and statistics courses (Norcross et al., 2016; Stoloff et al., 2010). Research Methods and Statistics, besides Introductory Psychology, are the most universally required courses of a psychology major in the United States (Friedrich, Childress, & Cheng, 2018) and are an important part of courses worldwide (Roberts, 2016).

In this chapter, we outline the rationale for teaching these courses, explore challenges teachers face when teaching this information to most undergraduates, and provide suggestions for turning pedagogical challenges into learning opportunities with undergraduate students. Furthermore, we provide resources for teaching these courses, suggestions on organizing course material, and a discussion of the trend to teach these courses in an integrated sequence. Throughout, we offer key recommendations for teaching and learning the content and skills in both of these interrelated areas, ones that most undergraduate students are anxious about and dreading.

Rationale for Learning Research Methods and Statistics

One of the most common complaints we hear from our undergraduate psychology majors amounts to "Why do we have to take these boring research methods and statistics classes when there are so many more interesting psychology classes we could be taking?" Of course, as teachers of these subject matters, we often roll our eyes (at least figuratively) when we hear such reactions. Having gone on for advanced study in psychology, we fully understand the importance of these courses. In addition to being foundational for the science of psychology, stronger research training correlates with self-reported research self-efficacy, a greater willingness to engage in additional research, and better critical thinking and analytical skills (Burke & Prieto, 2019), attributes that graduate schools seek in new students. However, many of our students may not have the same professional aspirations or be financially able to attend graduate school. Thus, although the rationale for these courses may be clear to us as teachers, we need to convey that importance to our students on their terms. For many students, the rationale for taking any course may boil down to one question: how can taking a course help them get a job? Although we as teachers may cringe at hearing this question, the reality is that our students, particularly traditional-age undergraduates, are dealing with the "How can that help you get a job" question from others (e.g., parents). We need to help them answer it, remembering that we as their teachers already have jobs that we love.

What do faculty members see as the main reasons why students should take Research Methods and Statistics? Faculty in one survey saw the most important reason for the course as developing scientific thinking skills (79%), followed by increasing engagement in the research process (28%), and preparing for higher-level courses (22%) (Ciarocco, Strohmetz, & Lewandowski, 2017). Indeed, as mentioned previously, students themselves tend to see these courses as geared toward preparing them for graduate school, regardless of whether they intend to pursue advanced study. Although these courses are certainly relevant to our graduate-school-bound students, we argue that these courses offer wonderful opportunities to help all students develop skills and have experiences that employers (and graduate schools) value (see Gardner, 2007; Hart Research Associates, 2015). For instance, Hart Research Associates (2015) found that the six most important outcomes of an undergraduate education are: (1) the ability to effectively communicate orally; (2) the ability to work effectively with others in teams; (3) the ability to effectively communicate in writing; (4) ethical judgment and decision-making; (5) critical thinking and analytical reasoning skills; and (6) the ability to apply knowledge and skills to real-world settings. As Christopher and Batsell (2019) detailed, the research methods and statistics courses offer ample opportunities to design assignments that allow students to develop some of these desired outcomes. For example, the fairly traditional project of having students do some combination of designing a study, submitting a research ethics proposal, collecting data, analyzing those data with software, and presenting the data (in a paper and/or poster or platform format) inherently requires students to use many of these skills. Making that fact explicit to students will help them understand the importance of such a project, even if they are

not aiming for a research-oriented graduate school program. Even more specific to making skill develop explicit to students, we ask our students to keep a journal that details how they developed these employer-desired skills so that they can draw on them in later endeavors, such as in constructing a resume, answering questions on an interview, or preparing a personal statement for a graduate school application. Every student, regardless of ability or motivational level, is interested in making or finding a job. Tying these courses (and all others) to this ultimate outcome can only serve to heighten students' interest in the material.

In addition to the skills that we can help students develop in these courses, we love teaching research methods and statistics because of the information in these classes. Of course, most of our students are not, at least initially, interested in research. Many of our best research students who go on to research-focused graduate programs found that passion only after enrolling in a research methods and statistics course. We try to start with something that students are actually interested in or at least can relate to before diving into anything technical, especially with statistics (Lawson, Schwiers, Doellmann, Grady, & Keinhofer, 2003). Indeed, likely one reason we as teachers find this information so appealing is because of how widely applicable it is. We need to convey that applicability to all of our students. For instance, one might introduce the topic of one-way analysis of variance (ANOVA) by asking students which wireless service they use. From there, you can ask which service is "the best," leading into a discussion of constructs and operational definitions. Once the class decides on a construct and its operational definition, discussion can lead into how to compare the three (or more) wireless services on that dimension. Typically, in our classes, students choose "customer satisfaction" as the construct of interest, leading into the one-way between-subjects ANOVA. From there, we do a conceptual example of what this analytic technique allows us to learn and the conditions necessary to use it. We then dive into conceptual discussions of the components of this analytic technique, such as between-group variability and within-group variability.

Key Challenges in Teaching Research Methods and Statistics

Every course has unique challenges that teachers must help students overcome. For instance, in abnormal psychology courses, teachers must help students overcome potential "medical student syndrome," in which students perceive that they see every psychological illness they read about appearing in themselves or someone they know. But what about the challenges teachers face in in the scholarship of teaching and learning suggests that faculty believe that the most common challenge in teaching these courses involves course design issues. Specific challenges included struggling with the balance between the different types of material, the available time to teach "everything," and making the material engaging. Other challenges involved teaching students how to conduct research, teaching data analysis, and teaching writing (Ciarocco et al., 2017). Perhaps one of the most salient challenges to teaching research methods and statistics is the students' perceptions of the course.

Boring/Irrelevant Content. One of our students once told us, "Psychology would be a perfect major if we didn't have to take these two classes" (or something close to that effect). Indeed, some – and perhaps most – psychology students may see research methods and statistics requirements as some sort of conspiracy that prevents them from taking other classes they would rather take. Indeed, these anecdotes are well-supported in empirical work. Research shows most students (75%) are not enthusiastic about taking research methods (Rajecki, Appleby, Williams, Johnson, & Jeschke, 2005), prefer to passively read or hear about research over actively conducting research individually or with a team (Rottinghaus, Gaffey, Borgen, & Ralston, 2006; Vittengl et al., 2004), hold negative attitudes towards research methods (Addison et al., 2015; Murtonen, 2005; Sizemore & Lewandowski, 2009), and fail to see the future relevance or utility of methods and statistics courses (Ciarocco, Lewandowski, & Van Volkom, 2013; Earley, 2014; Murtonen, 2015).

Research methods and statistics are the "core" tools of scientific psychology that allow researchers to draw conclusions about their work. As teachers, we appreciate this state of affairs. Our students, however, do not have this level of appreciation, and in many cases, have no desire to acquire it. Instead, they see these courses as barriers to what is otherwise a wonderful major! Thus, it is incumbent on us to demonstrate the importance of these courses to our students. For those aiming for graduate school, and particularly research-oriented programs, that is relatively easy to do. It is much more difficult to elucidate the importance of statistical knowledge to students who are taking the class because it is required in what is an otherwise interesting major.

Teacher-Student Enthusiasm Gap. A related challenge in teaching research methods and statistics courses is that students and instructors may not perceive the information in the same way. Strohmetz, Ciarocco, and Lewandowski (2018) reported students see learning to think scientifically and learning to do research as equally important, whereas their instructors place a higher value on learning to think scientifically. Students also saw these courses as preparation for graduate school more than as opportunities to cultivate employable skills. Whereas students worried about writing problems and learning how to design/conduct their own study, instructors were more likely to list student problems (e.g., lack of motivation and inability to engage in higher order thinking), as the most challenging aspects of the course. Students saw learning how to engage in research as a less important goal than their instructors did.

Given this enthusiasm gap, it is not entirely surprising that exposure to research methods and statistics courses can solidify attitudes that were already negative. After taking these courses, some students report seeing statistics and research knowledge as less useful (Sizemore & Lewandowski, 2009) and having less interest in scientific activities (Manning, Zachar, Ray, & LoBello, 2006).

Inherently Difficult and Abstract Content. Of course, in any given psychology course, there are some topics that students find particularly difficult, but in research methods and stats courses, the list of difficult topics seems much, much longer. Indeed, many of these topics serve as "potholes" or impediments to learning (Stoa,

Chu, & Gurung, in press). In a recent attempt to uncover potholes and repave the street in the United States, Stoa and colleagues asked undergraduate students to identify their challenges in research methods and statistics. The students could list up to five concepts that they found challenging, and then were asked to rate the difficulty of 63 research methods concepts (e.g., confound, effect size) derived from past research (Gurung & Landrum, 2013). The topics most often mentioned as challenging included types of validity (21%), quasi-experiments (5.8%), general knowledge of statistics (4.8%), and operational definition (4%).

A principle components analysis of difficulty ratings of the 63 concepts revealed five underlying factors: (a) Factor 1: items related to *Samples and Variables* (e.g., random assignment and confounds), (b) Factor 2: items related to *Ethics and Theory Data Cycle* (e.g., debriefing and informed consent), (c) Factor 3: items related to *Threats to Internal Validity* (e.g., attrition and demand characteristics), (d) Factor 4: items related to *Design Confounds* (e.g., systematic variability and third-variable problem), and (e) Factor 5: items related to *Scale Measurements* (e.g., Cronbach's alpha, and correlation coefficient). Do students in different educational systems across the globe find the same factors difficult? Research to answer this question is currently underway.

Overcoming Challenges to Teaching Research Methods and Statistics

Instructors have tried differing ways to address the challenges we have listed here, ranging from changing course design, to directly addressing how research methods and statistics classes are viewed by students.

Make the Course Applicable to Life. One of the biggest barriers is changing how students view the course. The good news is research methods and statistics are perhaps the classes in which we teach the most practical information in the major. The content is not only vital to our students' academic and professional development as discussed previously, but it is inherently interesting as well! We need to do a better job of highlighting the pragmatic value of the courses, and we can use the interesting content. Teachers can and should incorporate into these courses many "everyday" experiences that utilize core information about psychological science.

When teaching research methods, we suggest aiming to provide students with skills they can use in daily life and in the workforce, even if your course is aimed mainly at those bound for graduate school. Whereas most courses on the surface seem to be designed as preparation for graduate school (Lewandowski, Ciarocco, & Strohmetz, 2017), only a small portion of students will go on to graduate school. Consequently, start the course with many illustrations of how research design and analysis can be used in daily life can build student motivation for the course. For instance, to refer to a previous "real life" example from the one-way between-subjects ANOVA of phone service customer satisfaction, a research methods teacher could illustrate a variety of methodological designs. For instance, one could use

survey research to gather customer ratings of different restaurants and compare value and meal quality. In fact, although we have not done so ourselves, teachers could have students construct such a survey themselves, using principles of good survey construction (Berk, 2009). Doing so not only teaches them basic methodological information, but it provides a great chance to do a "real world" project.

One significant way to change how the course is perceived is to include many opportunities for students to interact with the material in an active way with the guidance of the instructor. One study tested the efficacy of a multifaceted approach that included both active learning and a form of scaffolding in which the instructor provided a temporary structure to guide the student towards learning (Ciarocco et al., 2013). Students do better in the presence of the knowledge expert (the instructor) than if they were learning independently. As the student learns the new skills, the instructor slowly removes the guidance and structures. For example, students first read a published psychological study and wrote an in-class summary. The instructor provided scaffolding by discussing the article with the class and asking specific questions about the procedure and analyses, and giving feedback on the students' critiques. The instructor then did an in-class demonstration of the same research design as featured in the paper the students read, and where the students served as participants. Students then discussed the study results and design in small groups, finally writing up their results. US students exposed to this approach showed improved ability to write in accordance with APA style, higher perceived utility of research and statistics, more positive attitudes toward statistics, and higher perceived skills/abilities in statistics.

Other possible solutions to alleviate students' negative attitudes about these courses include arranging for students to collect their own data rather than have data handed to them. Students who actively design and conduct research as part of their methods course report more interest in doing research, feel more prepared to conduct their own research, and have more favorable impressions of the course overall (Roberts & Allen, 2012, 2013). One note of warning, there is evidence that even when students collect their own data, if they do so in an online course they score significantly lower on measures of quantitative mastery of statistical concepts than students who collect data in a face-to-face class (Goode et al., 2018).

Pay Attention to Course Design. A major consideration in teaching research methods in particular is whether the course will stress experimental methodology or balance that material with coverage of correlational and descriptive designs. Given the extent to which most workplaces utilize survey data collection, it may be prudent to train students in descriptive data collection methodologies, as this skill can be built on in the discussion of correlational and experimental designs. If the course is designed to prepare students for a wide array of careers, you may want to build in a discussion of qualitative methods and quasi-experimental methods, a common need identified by instructors (Gurung & Stoa, 2020). Again, doing so increases the perceived value of the course by demonstrating its real-life utility.

A related consideration in course planning is the order in which to present information. If you will be using a textbook, you will likely find that most books

start with nonexperimental methods and progress through experimental designs. Therefore, it makes sense to organize the course in this order. However, we have found that students often have trouble understanding the limitations of various nonexperimental work without understanding the insights that experimental designs allow. Therefore, it might be a good idea to first introduce students to the basic two-group experiment, with a manipulated independent variable and random assignment to conditions, then address nonexperimental designs, including their strengths and weaknesses in relation to experiments. We know of no research that suggests incremental benefits of this topic organization, but we have found it useful.

Course organization is particularly important for statistics classes as well. Most statistics courses start with descriptive statistics, then present material on probability, hypothesis testing, and specific inferential techniques. Indeed, it would seem difficult for students to understand the latter areas without a foundation in the former. Within the realm of inferential statistics, however, there are a number of organizational options, depending on your teaching goals. You might want to link particular inferential statistics to the research designs with which they are typically associated. For instance, you could cover statistics such as correlations, univariate and perhaps multivariate regression, and nonparametric techniques such as chi-square in relation to analyzing data from nonexperimental research, and covers statistics such as one-way analysis of variance in relation to analyzing data from experimental research. One significant advantage of organizing the discussion of inferential techniques in this manner is that it allows students to see the connection between research methods and the statistical techniques needed to analyze the results of those methods. This organizational structure is especially easy to implement if you are teaching in a department in which research methods and statistics courses are combined or presented in a fixed sequence (see Christopher, Walter, Horton, & Marek, 2007, and our discussion to follow).

Another organizational decision involves whether and how to address "between-subjects" analyses vs. "repeated-measures" analyses. For example, one could cover the independent samples t test followed immediately by the paired samples t tests. This organization makes intuitive sense, as both analyses deal with comparing two means. However, it is equally sensible to follow the independent samples t test with the one-way between-subjects analysis of variance, as both analyses involve between-subject designs. We do not know of any empirical work that has assessed the relative effectiveness of these two approaches.

There are still other ways of organizing your presentation of inferential statistics tools. One of these is to start with the simplest ones. For most students, these would be the independent samples t test or possibly the Pearson correlation coefficient. You could start with the Pearson correlation, then extend that discussion into univariate (and perhaps multivariate) regression. You could next present the independent samples t test, followed by other mean-comparison tools as noted previously. Here again, we know of no empirical evidence that evaluates the effects of this plan on student learning.

Resources for Teaching Research Methods and Statistics

No matter how you chose to organize your course in research methods or statistics, we urge you to take advantage of the vast array of resources available to help you teach it well. Included in this array is a dense network of supportive colleagues who are eager to share their experiences and pedagogical ideas through listservs, blogs, and other social media such as twitter and Facebook. Here, we highlight only a few of the many books, websites, and other resources available to you.

An excellent starting source of ideas for both research methods and statistics is *Activities for Teaching Statistics and Research Methods* (Stowell & Addison, 2017). This compendium of 26 activities comes from a variety of teachers and includes, for example, having students repeatedly toss a pair of dice to create a frequency distribution table and bar graph (McEntarffer & Vita, 2017). We have found that this activity helps students to understand and appreciate the importance of large sample sizes by comparing the bar graph that results from 15 rolls of the dice compared with 75 rolls. The book includes another remarkably simple demonstration in which students draw slips of paper out of a container. It serves as the foundation for a useful discussion of sampling distributions and central limit theorem, two topics that, because of their hypothetical nature, tend to be among the most difficult for students to understand. These and other activities in this compendium can be used and/or adapted easily for classroom presentations or laboratory experiences.

Still other resources are to be found in the form of journals devoted to the scholarship of teaching and learning in psychology, especially *Teaching of Psychology* (http://teachpsych.org/top/index.php), the *Scholarship of Teaching and Learning in Psychology*, (https://www.apa.org/pubs/journals/stl/), *Psychology Teaching and Learning* (PLAT) (https://uk.sagepub.com/en-gb/eur/journal/psychology-learning-teaching). Each of these journals tends to publish a relatively large number of articles about teaching research methods and statistics material. For instance, in just one recent issue of *PLAT,* there were articles about managing statistics anxiety among undergraduates and student attitudes toward research. Indeed, it is the rare issue of these outlets that does not include information useful to teachers of these two classes.

Consider also the journal *Teaching Statistics* (https://onlinelibrary.wiley.com/journal/14679639) which, though not aimed specifically at teachers in psychology, provides a wide variety of ideas and activities for statistics teachers in any discipline. For instance, one recent issue contained a wonderful activity, using data about lead levels in the water supply in Flint, Michigan, USA, to illustrate descriptive statistics and the potentially life-altering effects they can reveal. The scholarly society associated with this journal, the Teaching Statistics Trust, also provides free resources to statistics teachers (http://teachingstatisticstrust.org.uk/).

In addition to scholarly journals, there are also conferences devote specifically to the teaching of psychology, and typically, there are numerous presentations on the teaching of research methods and statistics at these meetings. There are three such conferences in particular that we enjoy. First, there is the National Institute on the

Teaching of Psychology (NIToP: https://nitop.org/), which is held during the first week of January each year in St. Petersburg Beach, Florida USA. This conference provides 3.5 days of opportunities to learn about teaching in all areas of psychology, including platform presentations, poster sessions, idea exchanges, and numerous planned opportunities for informal interactions with other conference attendees who share similar teaching interests and responsibilities. Second, there is the Annual Conference on Teaching of Psychology (ACT: https://teachpsych.org/conferences/act.php), which is held each October in a different location in the United States. Typically, two full days, this meeting offers many opportunities similar to those offered at NIToP. Finally, the Association for Psychological Science holds a Teaching Institute as part of its annual convention, which is typically held in the USA or Canada during the last weekend each May (https://www.psychologicalscience.org/conventions/annual/teachinginstitute).

If you want to incorporate standard academic research into your methods and statistics classes, we suggest using primary sources on topics that tend to be of strong interest to students. A list of examples from clinical psychology is especially appropriate for use in research methods and statistics courses (Sizemore & Lewandowski, 2011). If you are interested in incorporating interdisciplinary issues into your courses, Christopher, Marek, and Benigno (2003) provided numerous examples, albeit somewhat dated now, of methodological and statistical exemplars from economic psychology.

We have found in both courses that the more we design assignments that are applicable to students' lives, the more likely it is that students will be motivated to learn the material. For example, on the first day of a research methods course, consider asking students answer a simple question such as: Is happiness relate to sleep? Ask each student to list how happy they are on a 10-point scale and to write down how much sleep they got the previous night. Open a statistical program such as SPSS or, for free easy-to-use software, JAMOVI, and enter all the data. Then calculate a correlation to answer the question. In one fell swoop, you have modeled the research process, namely, asking a question, collecting data, and analyzing it. This simple exercise can make the research process real while simultaneously demystifying statistics, software, and research design. It also provides the jumping off point for discussing shortcomings (e.g., why correlation does not establish causation) and proposing fixes (i.e., through designing an experiment). In short, take advantage of any and all activities and assignments that help demonstrate the importance of using statistics in ways that are relevant to the students' lives and to understanding psychological research.

Finally, using the previously discussed research on potholes and challenges, instructors should plan on covering the "hard" stuff together in class, in a low-stakes fashion. What are the concepts that your students find most problematic? Developing extra examples and applications for the most difficult concepts and allocating time in class for students to work together on assessing their comfort and knowledge of such concepts is critical. Explicitly signaling concepts proven to be difficult in advance may make students more likely and comfortable to ask for help when they have problems with the material.

Assessment of Learning in Research Methods and Statistics

Evaluation of the outcomes of research methods and statistics courses typically involves assessment of either student attitudes towards the material or their knowledge of that material. One measure of the former consists of a 30-item scale whose six subscales assess students' attitudes toward research, attitudes toward statistics, perceived utility of research, perceived utility of statistics, perceived ability in research, and perceived ability in statistics (Sizemore & Lewandowski, 2009). The scale includes items such as, "Reading articles about research in psychology is something that I enjoy" and "The concepts learned in a research class will be helpful to me in the future." Another scale (Allen & Baughman, 2016) measures students' confidence in seven different research methods skills, including, for example, their ability to "correctly identify the independent and dependent variables in an experiment," or to "run and interpret an independent samples t-test using SPSS."

Students' knowledge of research methods content can be measured in a number of ways, including total scores on the *Psychological Research Methods Survey* (Amsel, Allen, & Bauer 2014), a 10-item multiple-choice test about psychological research methods. One item, for example, reads as follows: "The part of an experiment that the experimenter deliberately manipulates is the: (a) hypothesis; (b) control group; (c) dependent variable; (d) independent variable." There is also a 20-item *Psychological Research Inventory of Concepts* (Veilleux & Chapman, 2017). It was developed using Item Response Theory, such that the multiple-choice items were derived from longer vignettes and validated on a diverse sample of students and Amazon Mechanical Turk workers.

Additional Considerations in Teaching Research Methods and Statistics

We once heard a colleague say that she had not really changed her research methods and statistics classes much during the past 20 years. On the surface, it may be true that a lot of the material that was important in these courses decades ago is still important today. However, the students enter higher education for a wide variety of reasons. Might these diverse goals affect what and how these courses will be taught in the future? We think so.

What Is Taught? There are five main factors that instructors in the USA believe are most important when teaching research methods and statistics: Basic Knowledge, Design, Skills, Statistics, and Other topics (Gurung & Stoa, 2020). In statistics classes, topics related to null hypothesis testing to be among the most essential (e.g., Giesbrecht, Sell, Scialfa, Sandals, & Ehlers, 1997). In fact, instructors of undergraduate statistics courses rated "statistical significance," "significance level," and "hypothesis testing" as among the seven most important terms (out of 374 examined) students needed to understand (Landrum, 2005). There was no mention of what are now called the "new statistics," such as effect sizes, confidence intervals, or meta-analytic techniques. Although these two particular studies are now relatively dated,

they do point to the need for statistics teachers to rethink precisely what information undergraduates need to know about this subject matter, particularly at an introductory level.

As noted previously, discussions of hypothesis testing are still the norm in undergraduate statistics classes (Friedrich et al., 2018), despite calls to abandon hypothesis testing results in favor of reporting other statistics, such as effect sizes and confidence intervals (e.g., Cummings, 2014). Though effect sizes are now commonly reported in the results sections of psychology journal articles, the reporting of "new statistics" feels to us to be inconsistent not only across journals but sometimes even within the same journal. Indeed, hypothesis testing remains a staple, so teachers of research methods and statistics are more or less obligated to continue emphasizing both, lest students not understand what they are reading in those journals.

How Is it Taught? A recent survey of undergraduate psychology programs in the United States (Friedrich et al., 2018) found that large majorities of departments require statistics courses (80% of general schools, and 79% of top-ranked schools) and/or research methods courses (85% of general schools, and 65% of top-ranked schools). In the subset of 83/385 departments requiring both research methods and statistics, most (71%) required that statistics be taken first; 11% required that research methods be taken first. A little less than a third of the departments required an integrated research methods and statistics course (28% of general schools, and 24% of top-ranked schools).

Because there are many reasons to integrate research methods and statistics, we think combined courses are likely to become more common than they are now. Integrated courses provide a context for students to learn statistics, enhance the transfer of learning from one course to the other, and illustrate how science actually works (Christopher et al., 2007). In the life of most academics, research methods and statistics go hand-in-hand, and it is actually quite difficult to separate them. Furthermore, whereas many of the textbooks available to the instructor are dedicated exclusively to research methods or statistics, there is a growing number of books that integrate both topics.

Knowledge of research methods and statistics form the core foundation of the discipline of psychology. Having a basic understanding of both these areas can make for a psychological literate global citizen. Both classes have their challenges as outlined previously; however, the effort to teach them well can pay off with a better functioning citizenry. Our solutions do not cover all bases, and there is work to be done. We trust the resources and opportunities suggested will also stimulate significant reflection and potentially a range of systematic, intentional modifications to teaching research methods and statistics.

Cross-References

► Qualitative Methodology
► Research Methods

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