



Teaching Challenging Courses: Focus on Statistics and Research Methods

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GSTA PEDAGOGY DAY, OCTOBER 28, 2016

Why combine statistics and methods?

- ▶ Much overlap of goals and topics
- ▶ Students learn better with the full picture (application)
- ▶ What we are doing is not working well
 - ▶ Students often do not recall information from the prior course
 - ▶ Teachers, books, and assignments (example designs and data) change
 - ▶ Information is not familiar with inconsistent context
 - ▶ Little student engagement in a research question, so data lack relevance
 - ▶ Statistics topics move too quickly, allowing limited thought-time
 - ▶ It's like teaching sensation & perception separately

Integrating Rather Than Combining

- ▶ Integrating statistics and research methods requires
 - ▶ Rethinking the way you learned it
 - ▶ Omit what undergrads don't need yet
 - ▶ Add detail where they DO need it
 - ▶ Add psyc-related info
 - ▶ APA style

Potential Problems

- ▶ Combined course limited to one term?
 - ▶ Stats as a course + methods as a course + lab(s) vs. 1 combined course
- ▶ Much more to cover
- ▶ Choose one textbook?
- ▶ Topics for courses if taught by several faculty members?
- ▶ Change curriculum
- ▶ Transfer students – course credits?
- ▶ *Get faculty buy-in*
- ▶ Even if only **Part 2** is combined, students benefit

Integration is Work

- ▶ Blank slate
- ▶ Rethink what students need for real life
- ▶ What designs and analyses are common?
- ▶ Keep it simple, but give students needed tools
- ▶ What can you omit so students learn ANOVA?
- ▶ What do we teach because that's what we were taught?

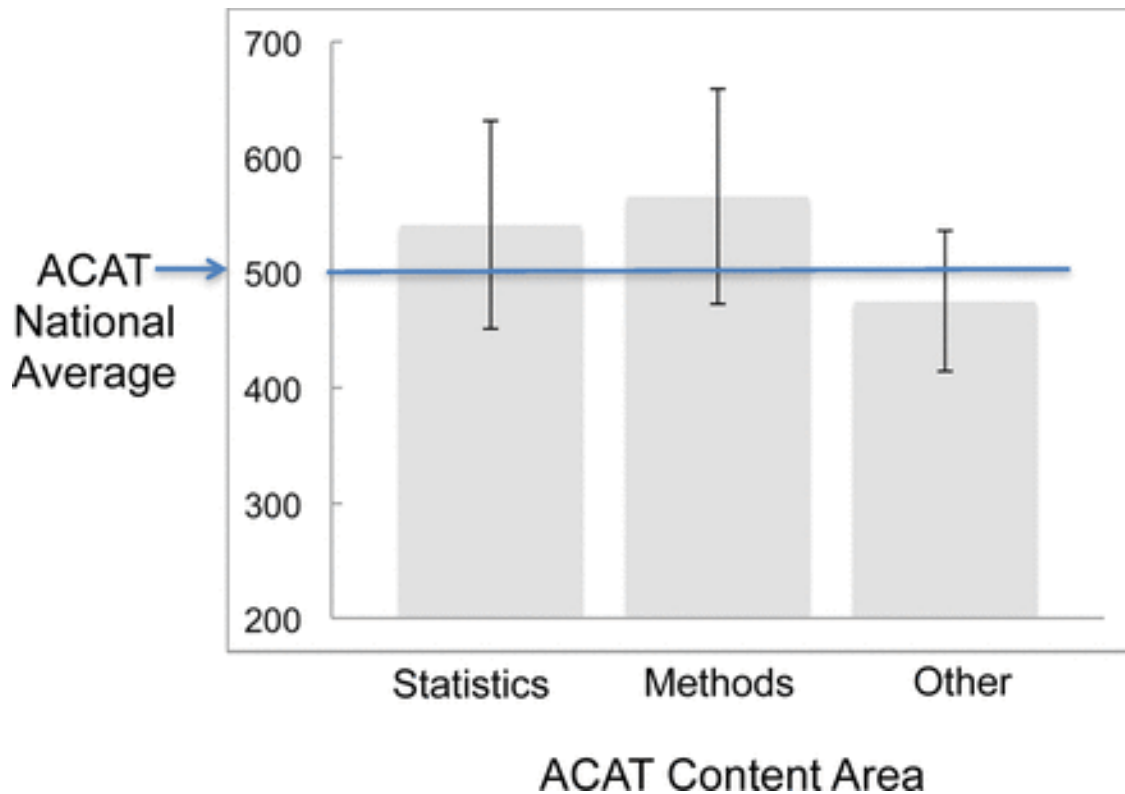
Why Change?

- ▶ When students see relevance, motivation increases
- ▶ Potential reduction in math anxiety because stats is not the sole course focus
- ▶ If a 2-course sequence, prepare students for Part 2
 - ▶ Wow your colleagues!
- ▶ Give students the tools they need to succeed

What does the research tell us?

- ▶ Groups
 - ▶ Statistics → Methods (2 terms)
 - ▶ Integrated (2 terms)
- ▶ Integrated had higher grades in each term and higher scores on senior exit assessment (Area Concentration Achievement Test)

What does the research tell us?



In an intense
methods/statistics
course...

One Way To Integrate

(Barron & Apple, 2014)

1. Explain a research design
2. Learn stats required for design
3. Students engage in a research project & analyze their own data
4. Discuss the experience (strengths and weaknesses)
5. Move on to a new design and statistic



Specific Challenges and Benefits

Challenge: Choosing Course Material

- ▶ What to cut?
 - ▶ z-test
 - ▶ Single-sample t -test
 - ▶ Cumulative-frequency graphs

What remains?

- ▶ *t*-tests
- ▶ ANOVAs
- ▶ Correlation analysis (Pearson's *r*)
- ▶ Prediction (including multiple linear regression)
- ▶ Chi square



one-way

two-way, etc.
(including mixed designs)

MANOVA

ANCOVA

MANCOVA

Traditional order of Statistics Topics

- ▶ Types of data, descriptive statistics
- ▶ Distributions (several types)
- ▶ z-tests
- ▶ Single-sample t -test
- ▶ Two-group t -tests
- ▶ ANOVA (if at all in a beginning course)
- ▶ Correlational analysis
- ▶ Regression
- ▶ Chi square

One of these topics is not like the others...

Proposed Order of Statistics Topics

- ▶ Types of data, descriptive statistics
- ▶ Chi-square tests
 - ▶ Much simpler data
 - ▶ Discussion of simple frequency
 - ▶ Students grasp the concepts quickly
- ▶ Correlational analysis
- ▶ Linear regression
- ▶ Two-group t -tests
- ▶ ANOVA
 - ▶ One-way and two-way analyses

Integrated Order of Topics

- ▶ Scientific method
- ▶ Ethics
- ▶ Types of data, data collection, & descriptive statistics
- ▶ Types of designs & probability
- ▶ Categorical variables & simple frequency
 - ▶ Chi-square tests
- ▶ Research without grouping
 - ▶ Correlational analysis
 - ▶ Regression
- ▶ Grouped designs with independent samples
 - ▶ *t*-test, ANOVA
- ▶ Grouped designs with related samples
 - ▶ *t*-test, ANOVA
- ▶ Grouped designs with two variables
 - ▶ ANOVAs

Integrated Order of Topics

- ▶ **Traditional methods topics discussed in relevant sections, such as Order Effects in the related-samples t -test and repeated-measures ANOVA**
- ▶ **Random Assignment to conditions when discussing the independent-samples t -test and between-groups ANOVA**

Challenge: Hand-Calculations

- ▶ Integration of two courses needs time
- ▶ Omit hand-calculations
- ▶ Focus on SPSS
 - ▶ Discuss SPSS input and output in detail
 - ▶ Can't be just mindless computing
- ▶ Benefits:
 - ▶ Less math anxiety
 - ▶ A more real-life approach

EXECUTIVE SUMMARY

Why Do We Need the APA Principles for Quality Undergraduate Education in Psychology?

The APA Board of Educational Affairs (BEA) Steering Committee for the 2008 National Conference on Undergraduate Education in Psychology designed these principles for quality teaching and learning for all stakeholders in higher education—students, faculty, departments, academic administrators, public policymakers, and the general public—to ensure that students are prepared for the challenges they will encounter as workers, family members, and concerned citizens in the new global century. These principles describe a set of recommendations for creating a world-class educational system that provides students with the **workplace skills needed in this information age**; a solid academic background that prepares them for advanced study in a wide range of fields; and the knowledge, skills, and values they will need to enter and succeed in the workforce and thrive in their daily lives.

**APA principles for Quality Undergraduate Education in Psychology
(2011)**

<http://www.apa.org/education/undergrad/principles-undergrad.pdf>

Challenge: More Class Time

- ▶ With streamlined topics and no hand-calculations, prepare for time
- ▶ After 20+ years, I have a new prep
 - ▶ Examples
 - ▶ Data sets
 - ▶ Handouts
 - ▶ Grading many assignments in detail

Benefit: More Class Time

- ▶ Cover more information, perhaps even MANOVA
- ▶ Repetition of information
- ▶ Time for students to collect real data
 - ▶ Design a research question
 - ▶ Address methodology issues
 - ▶ Collect data on campus (IRB approval)
- ▶ EXCEL for graphing
- ▶ APA style

Student Engagement

- ▶ With no hand-calculations, need student engagement in some form
- ▶ Correlation and Prediction using Cell Phones
- ▶ Inter-Rater Reliability
- ▶ (email me if you'd like the handout)

Summary of Benefits

- ▶ More logical flow of topics
- ▶ Focus on real-life designs and statistics
- ▶ Share the efficiency of SPSS
- ▶ Reduce math anxiety
- ▶ Allow more topics to be covered
 - ▶ Focus on APA style
- ▶ Repetition of key information
- ▶ ***Integration for better retention***

Future Challenges/Benefits

- ▶ A wealth of relevant data analyses
 - ▶ Ever growing
 - ▶ What will we need to cover later?
 - ▶ We will always have to choose and discard
- ▶ Technology in the classroom
 - ▶ SPSS
 - ▶ Smart phones for data analysis

Integrated Statistics and Methods

- ▶ Is integration standard in your department?
- ▶ Have you tried it?
- ▶ What works well?
- ▶ What challenges remain?



Questions?

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