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Multivariate Enhancements to Student Research Skills

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Multivariate Enhancements to Student Research Skills

Psychology 350: Research Methods & Data Analysis



ACE 10 Question

The current Psyc350 empirical research project requires students to apply several bivariate statistical models:

Pearson's Correlation

→ assess linear relationship of quantitative variables

Chi-Square Test of Independence

→ analysis of contingency tables

Between Groups ANOVA

→ comparison of means from cross-sectional designs

Within-groups ANOVA

→ comparison of means from longitudinal designs

Careful reviews of the methodological and data analytic content of 300- and 400-level Psychology courses revealed three multivariate models that were routinely presented in those courses.

Those topics were:

Factorial Designs & ANOVA

→ examine interactions & moderation effects

Multiple Regression

→ statistical control & multivariate modeling

Path Analysis

→ examine direct/indirect effects & mediation

Will incorporating these multivariate techniques into the Psyc350 empirical research project enhance student learning & performance ?

Method of Analysis

Lectures and laboratory assignments involving the three multivariate techniques were added to the Psyc350 course for all students. All students continued to complete the research project using the bivariate statistical models.

During four consecutive semesters, 120 students participated in the research study, 80 in the "project reanalysis" group and 40 in the "control" group. The groups were matched on sex, class rank, total credit hours, major credit hours, total GPA, Psychology GPA and yoked on research project topic, bivariate and multivariate statistical analyses used.

Project timeline each semester:

- Week 9 - all participating students performed the bivariate analyses for their project
- Week 10 – all participating students turned in their research report.
- Weeks 10 & 11 -- multivariate topics were presented in lecture and laboratory exercises were completed.
- Week 12 -- all participating students completed a survey & assessment of bivariate and multivariate models.
- Week 13 – students in the project reanalysis group then completed the multivariate reanalysis of their project and rewrote the Results , Discussion and Future Research portions of their research report.
- Week 14 – all participating students repeated the survey and assessment of bivariate and multivariate models
- Follow-up – all participating students completed a course-specific survey for each 300- and 400- level Psychology course they took subsequently. This survey assessed their understanding of the content of that course that had included the three multivariate techniques involved in the study.

Findings

Increased analytic confidence

- Students reported greater confidence with the bivariate and multivariate analyses after completing the project reanalysis and rewrite than before
- Students who completed the project reanalysis and rewrite reported greater confidence with the bivariate analyses and multivariate analyses than controls

Improved Bivariate & Multivariate Capability

- Students had better performance with bivariate and multivariate analysis techniques after the reanalysis and rewrite than before
- Students who completed the reanalysis and rewrite had better performance in assessments of the bivariate and multivariate analysis techniques than controls

Better Subsequent Understanding of advanced Psychological Content

- Students who completed the project reanalysis and rewrite reported being more confident when they encountered the bivariate and multivariate techniques in later 300- and 400-level classes than controls
- Students who completed the project reanalysis and rewrite had better performance in assessments of the content from later 300- and 400-level classes that used the multivariate techniques than controls

Improving ACE 10 Learning

We are currently restructuring the schedule for both the lecture and the laboratory portions of Psyc350 to providing instruction in these multivariate techniques in a timely manner, so that these analytic techniques can be incorporated into the empirical research project in that course.