
Designing A Research Study

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The Main Issue

- What are you trying to learn / prove / demonstrate?
- Have a point in mind
- Avoid my mistakes
 - Converting reports to articles
 - Getting interesting findings and attempting to come up with a question/hypothesis

Other Main Issues

- Multi-institution collaboration
 - Who's in charge?
 - Do you agree on time frame, instruments, courses, interventions, points, numbers of participants, etc.?
- IRB
 - Takes **a lot more time** to satisfy than you might imagine

Other Main Issues (2)

- How experimental is your quasi-experiment?
- Pre-screen your control/experimental groups
 - You have access to student records
- You **don't** need permission for institutional or program assessment, but you **do** need permission for student involvement for publications

Definitions

- Measurement (*What do you know?*)
 - Assigning numbers to things, people, events, actions, etc.
- Assessment (*How do you know?*)
 - Measurements, actions, processes, data that answer the question
- Evaluation (*How are we doing?*)
 - Comparing results and observations with goals and objectives (implied or otherwise)

Upon Use of an LO

- This was a good (bad) LO
 - Assessment: How do you know?
 - They told me they liked (hated) it
 - They did really well (poorly) on the quiz
 - There was a lot of (little) discussion in class on the topic afterwards
 - Marked (Slight or No) improvement from pre- to post-test
 - Experts approve (disapprove) of the LO
 - It covers (fails to cover) the basics
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Upon Use of an LO

- This LO was worth it (not worth it)
- Evaluation: Compared to what?
 - It was free (expensive)
 - It did (didn't) take much time to construct
 - We did (didn't) get the kind of gain we were hoping for or expecting
 - Strong (Weak) effect on course achievement (ceteris paribus)
- And the implications of the evaluation are?

Types of Research Design

Quantitative

- Experiment
- Quasi-experiment
- Survey
- Correlational Study

Qualitative

- Ethnography
- Case Study
- Historical Study

Issues With Instruments

- Don't build or develop you own (unless that is what you're trying to do)
 - E.g., the Peter Clarke Learning Objects Survey (PCLOS)
- Borrow (and adapt) pre-existing instruments
 - Google Scholar
 - PsycTests
- Ensure scale has a minimum of five response options
- You want to maximize variance on surveys and on tests

Are you mainly interested in *differences* or in *relationships*?

Differences

- *t*-tests
- ANOVA
- ANCOVA
- MANOVA
- MANCOVA
- Correspondence Analysis

Relationships

- Correlations
- Regressions
 - Simple
 - Multiple
 - Linear
 - Logistic
- SEM

Always include descriptive statistics. Graphs are (mostly) superior to tables.

Statistics: Who Is To Be Master?

- Select statistical tests that serve your
 - Purpose(s)
 - Conditions
- Feel free to run non-parametric tests as “confirmation” of the results of the parametric tests
 - E.g., Spearman’s ρ to “confirm” Pearson’s r
- Be aware of the requirements of techniques
 - E.g., at least 20 subjects per IV in regression

Statistics

- Standard statistical techniques **are** acceptable for Likert-scaled survey data
- **Don't** use NHST ($p \leq .05$)
 - Strongly influenced by sample size
 - Small p does not necessarily indicate a stronger relationship or effect, or practical significance
 - What people think it is: $P(H_0=0|\text{sample})$
 - What it actually is: $P(\text{sample}|H_0=0)$
 - Nobody cares (H_a not H_0)
 - How big is the effect? Does it matter?

Effect Size Statistics

- For Likert or interval-level data, when comparing two groups, use **Cohen's d**
 - $M_1 - M_2 / [(s_1 + s_2) / 2]$
- For ordinal data, when comparing two groups, use Probability of Superiority
 - $MWU / (n_1 n_2)$
- For correlations between two groups, use r or r^2
 - $(r) \times (r) \times 100$ gives % of variance explained

References

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Websites

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- www.socialresearchmethods.net/kb/contents.php
- <http://www.uccs.edu/~lbecker/>
- http://www.emeraldgrouppublishing.com/research/guides/management/study_design.htm