

*Qualitative Experimentation, Local  
Generalizability, and Other  
Oxymoronic Opportunities for  
Educated Researchers*

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By Gordon P. Brooks



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## *Some acknowledgments...*

- Thanks go to several colleagues and students at Ohio University who, sometimes unknowingly, have helped me formulate and refine some of the ideas presented here, in particular:
  - *John Hitchcock, George Johanson, Adah Ward Randolph, Jerry Johnson, Bob Barcikowski, Francis Godwyll, and many students*



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# *McCracken Hall*



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## *Some Limitations*

- I'm not a qualitative researcher, nor a mixed methodologist. I'm not a philosopher of science. My approach is pragmatic. I've thought about these ideas for a while, but there are likely still logical or philosophical flaws in some of the ideas (most of which are not new ideas)—but I put them out for others **to reject... or fail to reject.**



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# *Some Limitations*

- As a pragmatist, I look for *really useful* ways of thinking about research
  - anyone ever see *Thomas the Tank Engine*?)
- And most of the methods and issues I will be talking about are from an unabashedly *exploratory* approach to research



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## *Some Limitations*

- I try not to sound too cynical... but I do try to be purposefully provocative
- And I certainly still need to read more in these areas
- So I have probably missed some really useful relevant resources in preparing for this talk



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# *Oxymoronic Opportunities*

- Merriam-Webster Collegiate Dictionary (2000 computer version 2.5):
  - **Oxymoronic** is {*of or relating to a combination of contradictory or incongruous words*}
  - **Opportunities** are {*good chances for advancement or progress*}

*Forward regression, Missing-data analysis,  
Innovative replication, Unbiased estimates,  
Inter-subjective reality*



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## *Just a reminder*

- Article II. Section 2. Of the MWERA Bylaws states:

*“The specific purpose of the Association shall be to improve, promote, and disseminate educational research”*

– My aim here is to improve and promote...



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# Abstract

- As lines between paradigms continue to blur with the *ever-increasing popularity of mixed methods research*, there are useful—occasionally oxymoronic—opportunities for educational researchers to juxtapose tools from “opposing” methods. The “gold standard” is just not possible in so much we do with small-scale research – nor is it always desirable.



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# *Abstract (continued)*

- So what can we do? Are there new ways to think about research design, method, and analysis across commonly understood boundaries that normally guide our favored modes of inquiry? Can we further develop ways to *combine methodological principles across paradigms?* (interesting “debate” in Spring 2011 MWER)



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# *Qualitative Experimentation*

- Speaking of paradigms... and shifts...
- Of the relatively few references I found to **Qualitative Experimentation**, one was to Thomas Kuhn—a scientific approach
- Some mixed methods and qualitative scholars (e.g., Hunter & Brewer, 2003) talk about *Qualitative Experimentation* but sometimes with a slightly different meaning



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# *Qualitative Experimentation (continued)*

- My use of the term suggests designing studies using experimental design principles and analyzing experimental threats to validity, yet by collecting social science type qualitative data
- I propose calling this social scientific, mixed-method approach "*Quali-Experimental Design*"

– Manipulation without measurement...



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# *Qualitative Experimentation (continued)*

- The benefit of thinking experimentally—even correlationally—is that it helps us think about what variables to include and/or control in a study
- If we have **causal-like** questions, we can examine outcomes from experimental studies without measurement—obtaining really useful qualitative data



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# *Qualitative Experimentation (continued)*

- Using qualitative data collection methods doesn't make it qualitative research—with manipulated variables, in fact, it is much more like **experimental** research
- **Robbers Cave** (Sherif et al., 1954/1961)
- Causal arguments don't require numerical data—cause is based on logic, not numbers or *p* values (Shadish, Cook, & Campbell, 2001)



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# Qualitative Experimentation (continued)

- Because cause requires argument, I say that **research is a rhetorical process** (Rogers' diffusion of innovations applied to research results?)
  - Bradford Hill's (1965) criteria for minimal conditions to provide adequate evidence of a causal relationship:
    - *Theoretical Plausibility, Strength of association, Temporality, Consistency, Coherence, Specificity, Gradient (dose-response), Experimental evidence, Analogy (consider alternate explanations)*



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# *Qualitative Experimentation (as Action Research)*

- Many talk about Action Research as a qualitative endeavor—and so much uses qualitative methods but tries to answer **experimental** questions: “Does it work?”, “Which is better?”, “How much different?”



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# *Qualitative Experimentation (as Action Research)*

- When we have such experimental questions, the *idea* of Null and Alternative Hypotheses is a good *thing—even if we're not going to do statistical significance testing*
- The hypotheses can help us organize our thinking—and help us figure out how to protect ourselves from our own poor design



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# *Qualitative Experimentation (as Action Research)*

- The key point was that Action Research\* is *not inherently qualitative*—although that has certainly become most predominant.
- Very few definitions of Action Research require qualitative approaches (social movements).

*\* this talk began months ago as a polemic against Action Research*



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# *Qualitative Experimentation (as Action Research)*

- Can we use quantitative design & analysis principles—and experimental validity ideas—while using *qualitative data* (or even perhaps **quantitative data**)
  - Workshop by OU students on Thursday
  - Just like all research, **it's all about the RQ**



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# Action Research

- But there are other ways to improve Action Research—and small-scale applied quantitative research
- A promising approach to Action Research is to use *Single Case Designs* (i.e., group as case) and analyses, paying attention to both qualitative and experimental validity issues (Hitchcock, 2009) (not originally an Action Research idea)



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# Action Research

- For example, Action Researchers can:
  - Think about how to include non-measured covariates qualitatively (e.g., non-equivalent groups)
  - Think about pretest-posttest designs, but pay qualitative attention to experimental threats to validity
  - Think about alternative explanations and collect qualitative data to look for those relationships or explanations



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# *Back to a Quantitative Focus...?*

- Why do the research if we can't even *convince ourselves* we have evidence?
- We have started by talking about **applying experimental principles to qualitative data collection**... but it's fair that we also talk about *applying qualitative design principles to quantitative research and data collection*



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# *Some Oxymoronic Solutions (plus some less-moronic solutions)*

- Quantitative Case-studies
- Local Generalizability

## *Plus*

- New ways to think about **Validity**
- Single Subject / **Single Case Designs**
- A renewed focus on **Exploratory** research
- **Meta-Analysis**



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# Quantitative Case-studies

- *Qualitative design & analysis principles* applied to action research or quantitative research (I would argue that Action Research doesn't handle validity well enough, even qualitative validity)
- We might call it *Quantitative Case-study*—where we're talking about quantitative research *AS case study*, not just quantitative data *used in a* case study (e.g., Yin, 2009)



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# *Quantitative Case-studies (continued)*

(Let's be honest) Much quantitative research is flawed:

- **Sampling** doesn't usually allow generalization
- **Measurements** not psychometrically strong
- **Conclusions** often over-reach the designs, which often don't overcome potential researcher bias
- **Flawed stats** (e.g., assumptions not checked)
- **Theoretical rationale** is often inadequate

*My "Triumvirate of Evils"*

(obviously no longer just 3)



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# Quantitative Case-studies (continued)

- What if we start to think of our quantitative research as case studies? We could...
  - talk about why this “sample” or convenient population is an *interesting case*
  - *tell the stories* of our participants (not samples) through their quantitative data
  - *value exploratory* data analysis again: descriptive statistics for useful variables and collect really useful quantitative data



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# *Quantitative Case-studies (continued)*

- Research questions contain:
  - Variables
  - Relationships among variables
  - Population
  - *Context*



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# Quantitative Case-studies (continued)

- We can think in terms of a more *exploratory, model-building* approach
- We could study things we now consider inconveniences:
  - We can study *why* values are missing
  - We can study *why* cases are outliers
  - We can study *why* data have their shape

*And tell their story too...*



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# *Quantitative Case-studies (continued)*

- Performing exploratory studies requires thoughtful **attention to theory**:
  - Collecting the right variables
  - Analyzing the right relationships
  - Focusing on Internal Validity
- But we can use traditionally **qualitative tools**, like **Reflexivity**, **Triangulation**, **Journaling**, **Member-checking**, **Debriefing**



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# *Quantitative Case-studies (continued)*

- But some quantitative matters matter...
- For example, just because an instrument has poor psychometric properties doesn't mean it provides **no useful** information... just analyze it more qualitatively
  - How many quantitative researchers already analyze every item in a scale instead of the total scale...?



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# Local Generalizability

- Or sampling...
- Five levels of generalization:
  - Target Population
  - Accessible Population (sampling frame)
  - Sample
  - Participants / Respondents
  - Cases Analyzed
- We *inappropriately* use the word sample also for participants & cases analyzed



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# *Local Generalizability (continued)*

- There are a number of reasons we should focus on participants and the cases we actually analyze, rather than a *sample*:
  - Non-response or volunteer bias
  - Non-random sampling (e.g., convenience)
  - Damaged random sample
  - Convenient populations



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# *Local Generalizability* *(continued)*

- The idea of *local generalizability* is to draw a **truly representative sample** from this *convenient population*
- We can rarely hope to truly represent a large target population, so let's represent the smaller, accessible *convenient population well* instead of not representing a population at all with *convenient sample*



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# *Local Generalizability* *(continued)*

- We can then have confidence that our results have small-scale external validity (e.g., within our local/convenient population)
  - Maybe call it *purposeful random sampling*, and maybe sample an even smaller sub-population
- Then we use the ideas of *transferability* and *meta-analysis* to make sense of these local results



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# Exploratory Data Analysis

- As Tukey (1977, p. vii) said:

*“Once upon a time, statisticians only explored. Then they learned to confirm exactly—to confirm a few things exactly, each under very specific circumstances. As they emphasized exact confirmation, their techniques inevitably became less flexible... Anything to which a confirmatory procedure was not explicitly attached was decried as ‘mere descriptive statistics’, no matter how much we learned from it... Today, exploratory and confirmatory can—and should—proceed side by side.”*



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# *Some useful Descriptive Statistics*

- 3 out of 4 people make up 75% of population
- *Over half the population is above average\**
- 42.7% of all statistics are made up on the spot. (Steven Wright)
- 62.381527% of all statistics are made up on the spot. (<http://www.math.temple.edu/~paulos/>)



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# *Some useful Descriptive Statistics* *---NOT*

2 out of 4 people make up 75% of population  
New research has suggested that the number may be closer to 62.381528%.

- 62.381527% of all statistics are made up on the spot. (<http://www.math.temple.edu/~paulos/>)
- 51.663% of all statistics are **worthless or inappropriately precise** (*made up on the spot*)



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# *Descriptive Statistics can be Wonderful (e.g., Hans Rosling)*



# *Confirmatory Exploration*

- Tukey (1977, p. vii) also said: “We can no longer get along without confirmatory data analysis. **But we need not start with it.**”
- We jump to confirmatory analyses quickly, even without adequate theoretical rationale
- Just because we have tools available now doesn't mean we need to use them all the time



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# *Confirmatory Exploration ...A Cynical Perspective*

- Statisticians use data the way a drunken man uses lamp-posts, for support rather than illumination

## *Another one just for fun...*

- What do statistics professors get when they drink too much?
  - Kurtosis of the Liver

*(Both have unknown/multiple authors)*

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# *Confirmatory Exploration (continued)*

- When SEM models don't fit, as they so often don't, we move to *"exploratory" mode* to make some new adjusted model fit
- But why not go back to a *true exploratory* mode? If the theory doesn't fit, let the data speak...
  - *We need a new word for this "exploratory" model-adjustment process*



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# Confirmatory Exploration (continued)

- *“Far better an approximate answer to the right question, which is often vague, than an exact answer to the wrong question, which can always be made precise.”*  
(Tukey, 1962)



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# Exploratory Confirmation

- *Model-building* is back in vogue
- Isn't it interesting that we once used EFA to *confirm* factor structures—now we use CFA to *explore* fitting models better?
- Here's one to purposefully provoke: from a *model-building perspective*, isn't stepwise regression a reasonable (even if not the best) approach to compare models?



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# *Exploratory Confirmation (continued)*

- One of the problems with confirmatory analyses is that we *always* have model specification issues—our models are only as good as the variables we've decided to include from our imperfect theories
- *"All models are wrong; but some models are useful."* (George Box, 1979)



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# *New Validities*

- So much of what I've been talking about is leading toward a new way of thinking about *validity* in research
- Here is a proposal for a new scheme for validity, that potentially may apply to quantitative, qualitative, and mixed methods research—and allow us to talk meaningfully *across modes* of inquiry



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# *New Validities (continued)*

- And are qualitative and quantitative methods really that different?
  - For example, a reasonable argument (in my quantitative mind) can be made that thematic analyses rely on numerical concepts like **frequency**, **range**, & **magnitude** (e.g., *researcher as instrument*)
  - Now is not the time to talk about epistemologies...



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# *New Validities (continued)*

- Theoretical Validity.....(the right **reasons**)
- Design Validity.....(the right **methods**)
- Representative Validity.....(the right **sources**)
- Data Validity.....(the right **information**)
- Conclusion Validity.....(the right **answers**)
  - Added theoretical last



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# *Standards for Reporting on Empirical Social Science Research*

- Problem Formulation
- Design & Logic
- Sources of Evidence/Cases
- Measurement & Classification/Coding
- Analysis & Interpretation
- Generalization & Ethics

*AERA (2006) Educational Researcher, 35(6), 33-40*



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# *New Validities (continued)*

Theoretical Validity.....(Problem Formulation)  
Design Validity.....(Design & Logic)  
Representative Validity...(Sources of Evidence)  
Data Validity....(Measurement & Classification)  
Conclusion Validity....(Analysis & Interpretation)



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# *Theoretical Validity*

- Why is the study significant?
- What can we learn in terms of transferable or generalizable knowledge (as opposed to application) from this study?
- Is there theoretical support for variables & models specified, relationships found, and conclusions reached? (it's all about the theory)
- Are causal arguments plausible?



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# *Design Validity*

- Are we confident that evidence we obtain from our design can be used to make the knowledge claims we hope to make by answering our research questions?
- How strong a causal argument can you make (i.e., internal validity)?
- *“You can't fix by analysis what you bungled by design.”* (Light, Singer, & Willett, 1990)



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# *Representative Validity*

- How well do the participants or cases represent what you are studying?
  - Do they represent your accessible or target population (i.e., external validity)?
  - Do they represent extreme or typical cases, or the case, in purposeful sampling designs?
- How well can you describe the cases for generalizability or transferability or utility?



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# *Data Validity*

- How well do your data represent what you purport they represent (e.g., construct validity, scope, context, saturation)?
- What psychometric, credibility, accuracy, or trustworthiness evidence can you provide?
- Do you have evidence that the data accurately represent perceptions, or facts, or attitudes, etc...?



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# *Conclusion Validity*

- What evidence supports your claims—whether statistical, analytical, thematic?
- What rationale justifies your implications and recommendations?
- Do you have multiple sources to support your claims (e.g., triangulation, replication)?
- What assumptions are used/violated?



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# Random Transition...

I needed a transition to get from Validity to the next topic, but couldn't figure one out...so this is it.

*Plus, I couldn't go a whole presentation without a single statistical formula.*

$$t' = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad df' = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1 - 1} + \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2 - 1}}$$



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# *Medical Model*

- These previous ideas would not apply to all quantitative research... We will still need larger scale studies with strong designs and strong sampling methods in order to confirm theory
- But many studies fall into this realm of no realistic hope for external validity
  - We can use a more medical model...



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# *Medical Model (continued)*

- Retrospective *Case control studies* with extensive data collected every day
- It works in medicine because of the vast amounts of data they collect often
- We would need to identify *meaningful variables* to collect on a regular basis (like medical/hospital charts)
  - Daily journaling—teacher as researcher



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# *Medical Model (continued)*

- Research includes methodologists and statisticians on many papers (shameless self-promotion)
- Clinical Trials *separate internal and external validity* (useful oversimplification)
  - Efficacy Trials—capacity for beneficial change (internal validity)
  - Effectiveness Trials—does it work in the real world (external validity)



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# *Clinical Trials in Drug Studies* *([www.fda.gov](http://www.fda.gov))*

- Phase I (n=20-80)
  - Determine dosing, identify side effects, **safety**
- Phase II (n=100-300)
  - More safety data, evidence of beneficial effects (**efficacy**), acceptable risks
- Phase III: (n=1000-3000)
  - More safety (side effects) and **effectiveness**, new populations, comparisons, interactions, dosages



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# *Clinical Trials in Drug Studies* *([www.fda.gov](http://www.fda.gov))*

- Phase IV
  - After a product is approved, more about **long-term** risks, benefits, and optimal use, test the product in different **populations** of people
- Phase II-III use placebo-controls/comparisons
- Inclusion and/or exclusion criteria
- Randomization, blind, double-blind



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# Clinical Trials in Education

- We do Phases I and II *as if they were* Phase III, trying to test efficacy and generalizability in the same studies, often using false claims—or no claims—of external validity (and inadequate attention to internal validity)
- We need large-scale, grant funded research (RCT's) as our Phase III
  - But we *also need to value* our Phases I and II more, providing more grant funding



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# *Clinical Trials in Education (continued)*

- Phase IV could be in education what Mary O’Hair talked about during her Luncheon Keynote address:
  - Moving research out of the lab—or beyond the study—to create *innovations for practice* and to continue to monitor how well it works
  - Similar to AERA mission “to promote the use of research to improve education and serve the public good”



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# Summary

Where or from whom will you acquire the data for your qualitative problem-finding study? We suggest five data sources: (a) Self, (b) Literature, (c) Theory, (d) Advocates, and (e) Skeptics. Regarding the self as a source of data, Crowl (1993) notes that "One of the most fertile sources of research ideas is you" (p. 27). For example, what experiences have you had that are pertinent to your topical area? Also, what are your thoughts and opinions concerning this topic. With respect to the literature, "...there is no substitute for knowing the territory..." (Krathwohl, 1993, p. 75). Being intimately familiar with the professional literature in your general area of interest is a For example, what experiences have you had that are pertinent to your topical area? Also, what are your thoughts and opinions concerning this topic. With respect to the literature, "...there is no substitute for knowing the territory..." (Krathwohl, 1993, p. 75). Being intimately familiar with the professional literature in your general area of interest is necessary prerequisite to problem identification. A researcher can also work deductively by starting with a theory. Consequences, or predictions that might be observable in practice and which would serve to either confirm or deny a theory can be investigated. Finally, both advocates and skeptics should be consulted. These individuals will serve as your key informants in the qualitative problem finding-creating effort. Advocates have carefully considered perspectives on the topic of interest and may have unique insights or a number of unresolved issues they may be willing to share with you. If you really want to understand the weaknesses of an idea, however, discuss it with someone who is critical of the notion or who holds an opposing viewpoint. Assumptions- What assumptions are being made? Tacit or overt? Are they reasonable? Who is making be investigated. Finally, both advocates and skeptics should be consulted. These individuals will serve as your key informants in the qualitative problem finding-creating effort. Advocates have carefully considered perspectives them? What are their consequences? Challenges- To what extent are aspects of this area open to challenge? By whom? Are they political? What are competing viewpoints? Importance- Why is this area important---which parts? Who studies here? Are the questions more relevant to theory or practice? What's Hot- What is the current thinking? Have the newest ideas shown to be effective and practical? Where is the unfinished work? What's Cool- What is the "other side" of current thinking ? What is presently unpopular? What does older lit say about current thinking? Provocative- Provocative statements, uncharted areas, unverified findings, and interesting ideas can also be sources of RO's History- How did we get to this current state of knowledge? Where were we? be investigated. Finally, both advocates and skeptics should be consulted. These individuals will serve as your key informants in the qualitative problem finding-creating effort. Advocates have carefully considered perspectives Can we predict where we may go? Ideal/Goal- What is the ideal situation or goal? Is this ideal reasonable? What are pitfalls regarding reaching the goals? Extremes- Take the notions and recommendations to their logical (or not) extremes. Is this extreme desirable? Are there dangers? Controversy- What is current controversy in this area? Where are areas of conflict? What are tacit agreements? Who gains/loses? Contradictions- What is contradicting what? Who is contradicting whom? What is the quality of the positions? The Gaps- Why are there gaps?

## *Just Kidding...*



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## Summary (continued)

- We need better methods to tell the story of our **participants** in small-scale research. Perhaps *quali-experimental* designs and *quantitative case-studies* will give us mixed-method options we need.
- I think we need to use **GOOD** mixed-methods designs in small-scale quantitative and Action research (hierarchy of difficulty)



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## *Summary (continued)*

- We need to focus on Design Validity
- We need to focus on Data Validity, with concern over the quality of the information we are obtaining (whether psychometric or not)
- We need to focus on Representative Validity, but not generalizability
- We need to pay attention to Theoretical Validity and Conclusion Validity



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## Summary (continued)

- We need to **pay better attention to validity**, and what counts as evidence, in all studies, quantitative & qualitative, small & large
- We need good larger-scale quantitative research, perhaps using a Clinical Model
- NCATE talks about a **Clinical Model of Teacher Preparation**—why not a clinical model for educational research?



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## Summary (continued)

- *Effect sizes* will likely be results of choice
- No need to argue over whether to perform NHST or calculate  $p$  values—*sampling error is relevant only as a local issue* (Confidence Intervals? Statistical power? Neyman-Pearson?)
- Randomization and Permutation tests (exact tests) might prove useful for those who still feel a need for probabilities



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*Thank you*

