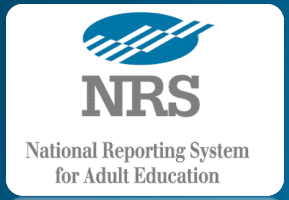
NRS Myth Busters: The Truth About Adult Education

American Institutes for Research

Welcome

OVAE and Project Team



Myth Busters Training Goals

- To help states use NRS and other data to better understand an issue that affects their programs
- To provide training to state teams to improve their capacity to conduct research and data analysis on their own
- To build a data-driven knowledge base in adult education

Agenda

Day 1

- Welcome, Overview, Icebreaker
- State Presentation of Topics and Plans
- Research Planning Model
- Introduction to Planning Tool
- Procedures
- Data Quality Issues and Threats to Validity
- Questions and Discussion

See Agenda

Agenda (cont'd)

Day 2

- Presentations and Discussion With ELC Participants
- Refining Your Research Question
- Research Design
- Analysis, Reporting, and Sample Size
- State Planning Time: Research Design

Agenda (cont'd)

Day 3

- Develop Your Data Analysis Approach
- State Presentations of Plans with Feedback
- State Development of Final Plan
- Developing Your Reporting Plan
- Discussion of AIR Support
- Adjourn

Outcomes

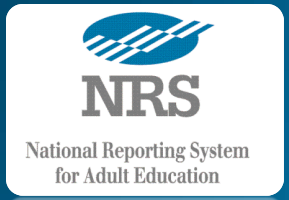
- Understand basic evaluation and research methodology as well as approaches to conducting research
- Select and refine a research question within a topic area (a myth to bust or other topic to explore)
- Work with other state teams to identify areas for collaboration in research, data collection, and/or reporting
- Develop data and analysis plans
- Begin analysis and develop reporting plans for a myth busting research project

Ice Breaker

Give us your name, state, role, and a hypothesis about the person coming after you.

NRS
National Reporting System for Adult Education

Getting Started



See Guide pp. 2-9

Research Question

- State goal
- Bust a myth
- Measurable

Do students in classes taught by teachers who have more years of teaching experience have higher test scores?

Do students who use a new math curriculum gain an educational functioning level faster than students who do not use the new math curriculum?

Inputs and Outputs

- Inputs
  - Characteristics or activities of the program, teachers, or staff
  - Intervention or student/teacher factors studied
  - Could be contact hours or service program provides
  - Might affect what you find

Do students in classes taught by teachers who have more years of teaching experience have higher test scores?

Input: Teacher years of experience

Inputs and Outputs (cont'd)

- Outputs
  - The outcomes you're interested in
  - What you are finding out

Do students in classes taught by teachers who have more years of teaching experience have higher test scores?

Output: Student test scores

Inputs and Outputs (cont'd)

Do students who use a new math curriculum gain an educational functioning level faster than students who do not use the new math curriculum?

Input:
Curriculum

Output:
Gaining an EFL

Data Needs

- What data do you need to answer the question?

Do students in classes taught by teachers who have more years of teaching experience have higher test scores?

Data Needs:

- Teacher experience
- Student enrollment
- Test scores

Data Needs (cont'd)

- What data do you need to answer the question?

Do students who use a new math curriculum gain an educational functioning level faster than students who do not use the new math curriculum?

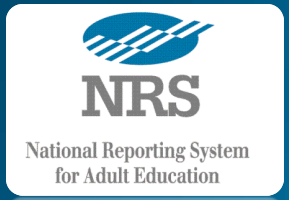
Data Needs:

- Curriculum use
- Student enrollment
- EFL level, level advancement

Data Sources

- NRS Data in Program Database
  - EFL Level
  - Level advancement
  - Contact hours
  - Student ethnicity, gender, age, employment status
- Other Data Possibly in Program Database
  - Enrollment status
  - Test scores
- Data from Other Sources
  - Teacher education or years of experience

State Presentations



State Jigsaw

- Take jigsaw handout and collect the information requested
- Add your discoveries to the appropriate chart paper
- NRS team will summarize state plans
- States can revise as needed

- All Participants: Consider overlap with your studies and where you might collaborate

See Handout 1: State Jigsaw and Handout 2: Identification of Collaboration Opportunities

Break

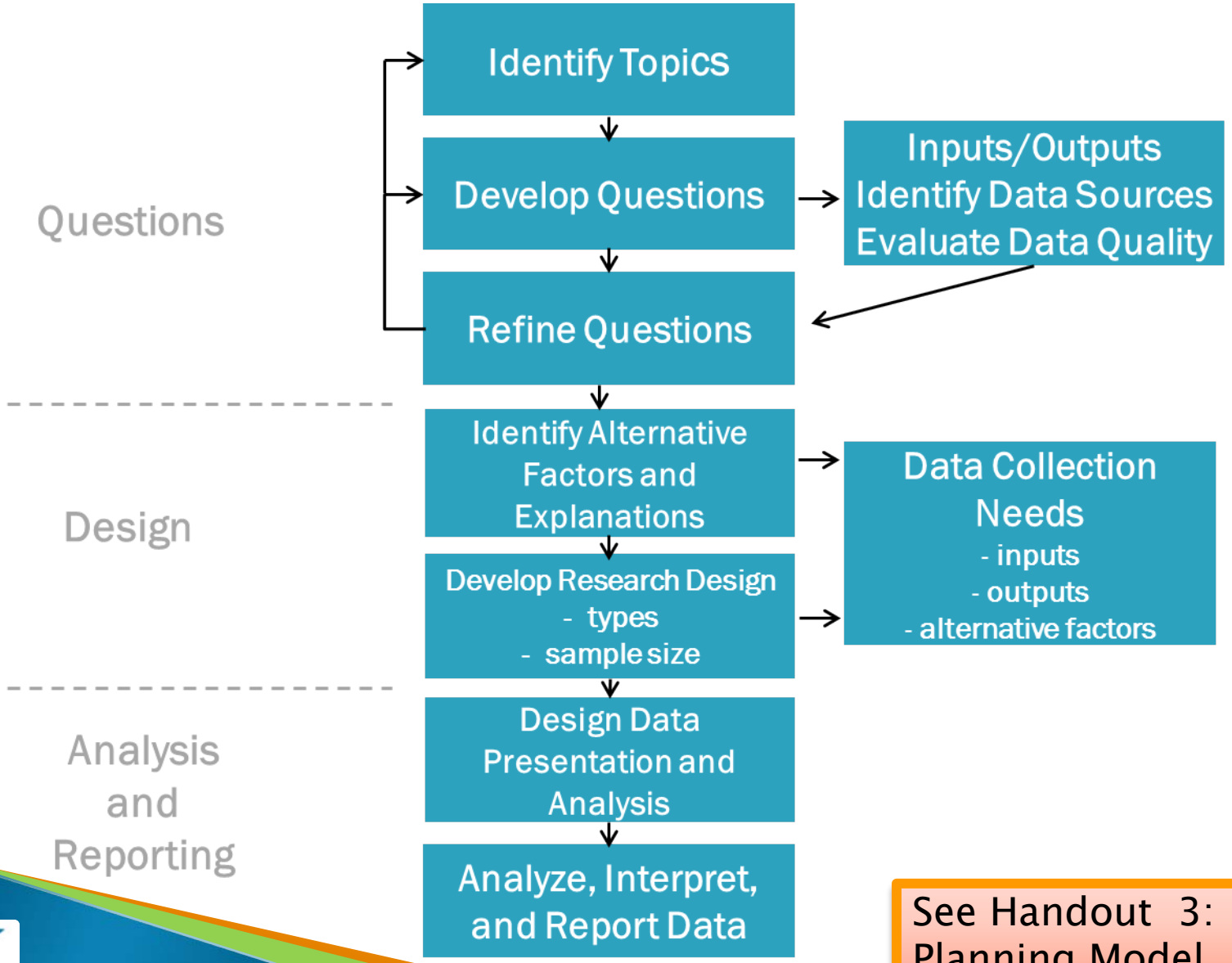
NRS
National Reporting System
for Adult Education

Evaluation Research Planning Model

Evaluation Research Planning Model

- Basic step-by-step model from idea to analysis
  - Three parts: Questions, design, and analysis and reporting
- Includes basic research design concepts, using nontechnical language and approach
- Guides our training model and activities and is the basis for the research plan you'll develop here

Planning Model (cont'd)



See Handout 3: Planning Model

Planning Tool

See Handout 4: Evaluation/Research Planner

Handout 4: Evaluation/Research Planner

This planner is designed for use while your state team plans an evaluation or research project. The planner should be revisited and modified, as needed, frequently. Use the first box below to maintain the status of your plan. You should fill out the next steps table each time you have completed an update of the plan. The Research Question and Evaluation Method section is up front because teams should frequently check back to make sure the rest of their plan aligns with their research question and goal(s).

State:

Team members:

Date last updated: [Click to select a date]

Status:

Next Step	Person Responsible

SECTION A: Research Question

Research question:

Goal of research question (e.g., debunking a myth, connected to organizational goal):

SECTION B: Variables:

Inputs (What is being provided? Example: hours of instruction, teacher experience, curriculum):

Outputs (What changes are you measuring? Example: attendance, test scores, educational levels):

Go back to your research question. Does it reflect your inputs/outputs? If not, readjust.

SECTION C: Data Sources

Data Needs (e.g., student ethnicity, test scores, contact hours)	Data Sources (e.g., NRS Data, other data in program database)	Data Available

SECTION D: Data Collection

What kind of study is this?

Sample size:

Data collection tools:

Data collection process:

Data collection begin date: [Click to select a date]

Data collection end date: [Click to select a date]

Person/people responsible for data collection:

SECTION E: Data Quality

Data quality issues to address:

How we will address data quality issues:

SECTION F: Data Analysis

Are you conducting secondary data analysis or exploratory analyses?

Descriptive statistics we want to run:

Other analyses:

Person/people responsible for data analysis:

SECTION G: Threats to Validity

Potential Threat to Validity	How Threat Will Be Addressed

SECTION H: Reporting Plan

Plan for report:

Format(s) for final report:

Timeframe to create, review, disseminate final report:

Person/people responsible for final report:

Dissemination plan (include target audience):

Person/people responsible for dissemination:

Using the Planner

Using your webinar worksheet and any additions or edits, complete sections A-C in you Evaluation/Research Planner

See Handout 4: Evaluation/Research Planner Sections A-C

Procedures: Your Method for Research

See Handout 5: Operationalization and Planning

Procedures & Operationalization

- **Operationalization**: How will you define variables and what will you do?

- **Procedures**: List out the activities you will perform to collect and analyze data

Operationalize Your Measures

- Translates concepts into practical definitions
- Identify key variables from research question
- Conceptually represents the measures
- Defined in terms of procedures and data

Operationalize Measures: Examples

- **Online and classroom-based instruction**
  - Online: Moodle classroom, nonfacilitated, 6 hours per week
  - Classroom based: Face-to-face classroom, 6 hours per week

Operationalize Measures: Examples (cont'd)

- **Professional development**
  - Teacher attends 8 hours of training on specific topics related to teaching

- **Student learning gains**
  - Scaled pre-posttest scores on TABE total battery

General Guidelines for Planning Procedures

- Work with staff to identify all steps
- Consult prior studies for guidance
- Include:
  - Staffing and resources
  - Schedule and timeline – then double it (at least)
  - Anticipate problems
- Be flexible – change according to needs

Procedures for Data Collection and Analysis

- Your recipe or road map for conducting the study
- Critical to guide you and others for interpretation and replication
- Varies by type of study but guided by research question

Procedures for Data Collection and Analysis (cont'd)

- General commonalities by type of design, but many procedures are specific to project
- Includes ways to develop operational definitions

Exploratory Studies: Secondary Data Analyses

- Identify the variables you need.
  - Don't forget control variables.
- Determine sample sizes: number of programs, classes, and students (more later).
- Do data definitions and codes match needs for the research question?
- Obtain data use permission and meet confidentiality needs.

Secondary Data Analyses (cont'd)

- Evaluate technical issues and needs
- Clean data
- Recode, eliminate data, programs or classes, as needed
- Plan analytic approach
- Reconsider, finalize approach

New Data Collection

- Needed when design requires additional data—quantitative or qualitative—to:
  - Fill in data that does not exist or is difficult to quantify
  - Complement other types of data
  - Provide an understanding of what, how, when and where (e.g., implementation study)

New Data Collection (cont'd)

- Develop data collection instruments
  - Surveys, observation, focus groups, document review guides
- Determine operational definitions, procedures
- Resources, time, validity issues for development

Planning New Data Collection

- Decide on approach, based on design (e.g., observation guide of classroom activities, survey, assessment of teacher or student knowledge)

- Develop items, informed by:
  - Research questions
  - Research
  - Validity, controls, contextual data

Planning New Data Collection

- Pilot test and revise
- Train staff
  - Administration
  - Reliability for subjective ratings and observations

Procedures for New Data Collection

- Select respondents
- Determine sample size
- Data collection
- Identify staff and resources needed

Data Issues–New Data Collection

- Quantitative data
  - Put data in electronic form Code categories, if needed
- Clean data
  - Run frequencies, correct errors
  - Check for missing data
- Determine analysis approach and software
- Provide sufficient resources (staff time, funds)

What does it look like in your state?

- Complete the Planning Section of Handout 5
- Revisit Section B of your Evaluation/Research Planner as a State
  - Have you operationalized your variables (inputs/outputs)?
  - Do you need to adjust?
- Complete Section D of your Planner as a State:
  - What kind of study are you implementing?
  - How will you collect data?

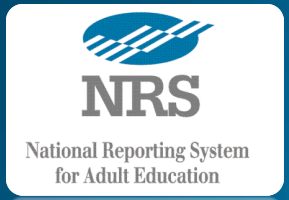
See Handout 5: Operationalizing & Planning (Planning Section) and Handout 4: Evaluation/Research Planner Sections B & D

Share at Your Tables

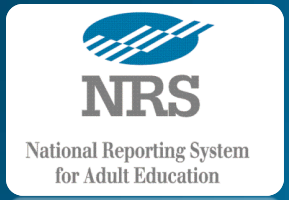
- What are your variables (inputs/outputs)?
- What kind of study are you implementing?
- What kind of data collection will you do?

Working Lunch

Evaluation/Research Planner Sharing Session



Data Quality Issues: What you don't know about your data can mess you up!



See Handout 6: Data Quality Challenges

Why should we care about data quality?

(http://youtu.be/k4gj_RdtKCw)

NRS
National Reporting System
for Adult Education

Data Quality…What Data Do You Really have?

- Results only as good as the data
- Affects usable variables, sample size, analyses
- Can vary even within a single data set
- Affects validity of analyses, conclusions — introduces biases
- Won’t really represent the concept being researched

Data Quality Problems

- **Existing data**: assess quality and access
  - Definitions and codes
  - Coverage
  - Data collection procedures, errors
  - Technical issues

- **New data collection**: ensure quality through design and data collection

Data Definitions

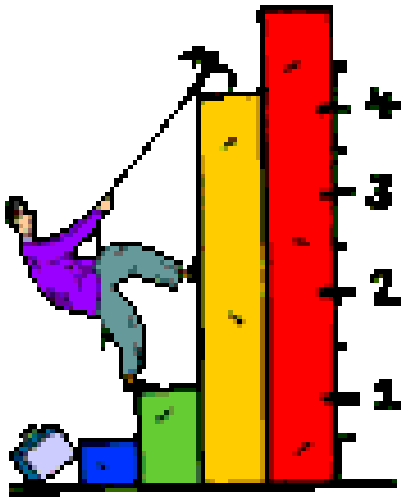
- **Measure definitions**
  - Consistent definition and interpretation across programs
  - Consistent across databases
  - Same over time
  - Matches research needs

Data Definitions

- **Coding of measures**
  - Categories or continuous
  - Categories match needs

Examples of Definition Issues

- **NRS Race and Ethnicity Definitions**
  - Changed in 2010
- **Attendance**
  - Reported daily, weekly, monthly, or less frequently?
- **Test Scores**
  - Scales, raw scores, or EFLs only

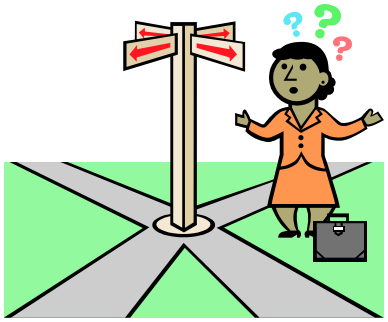


Examples of Definition Issues (cont'd)

- **Student Age**
  - NRS reports categories, but actual age may be preferable

- **Teachers' Years of Experience**
  - Total years? Year in program? Years teaching subject?

What issues do you see arising from these differences?



Data Coverage

- **Coverage** : whether you have enough data, data of sufficient depth, or data from enough of your subjects

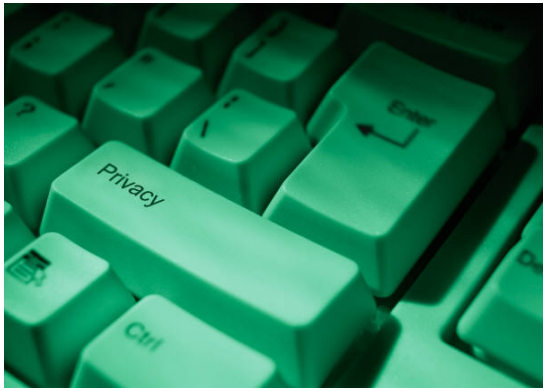
- **Possible coverage issues**:
  - Missing test data
  - Different tests used
  - No data available
  - Longitudinal data
  - NRS follow-up measures not collected or missing
  - Data availability across local programs

Data Collection Issues

- **Data entry errors**
- **Incorrect administration (tests, survey items)**
- **Missing and incomplete data**
  - Ideally, 20% or fewer cases missing but…
  - 50% or more may be missing
  - Consider whether it's too large to use

Technical Issues

- Different database formats across databases
- Database relationships
- Changes in databases over time
- Confidentiality and privacy concerns



Some Ways to Resolve Data Quality Problems

- **General**
  - Review error checks in data system
  - Look at tables to gauge missing data and identify errors

- **Definitions and Coding Issues**
  - Recode by combining or creating categories
  - Separate analyses for incompatible variables

Some Ways to Resolve Data Quality Problems (cont'd)

- **Missing data**
  - Obtain data from another source
  - Use classes, programs that have the data
  - Use statistical correction (complicated!)

- **Coverage**
  - Use proxy measures

- **If all else fails:**
  - Collect new data
  - Revise your research question

New Data Collection

- Build in quality by design

- Consider same quality considerations as with existing data
  - Definitions and coding
  - Coverage
  - Data collection procedures
  - Technical issues

Designing New Measures

- Definitions: clearly identify concepts and variables to measure
- Design coding categories and rating scales
- Evaluate for biases
- Pilot test and evaluate

Data Collection Needs

- Coverage: sample
  - Who will provide the data?
  - Sample size
- Develop methodology
- Determine time, staff, and resources needed
- Train staff
  - Procedures, consistent interpretation
  - Inter-rater reliability
- Quality control-data checks

Planning Activity

Refer to Handout 6 and Planner Section E.

In your state teams, identify any potential data quality challenges and ways to resolve them. Add challenges to your planning guide.

See Handout 6: Data Quality Challenges and
Handout 4: Evaluation/Research Planner Section E

Break

NRS
National Reporting System
for Adult Education

Threats to Validity

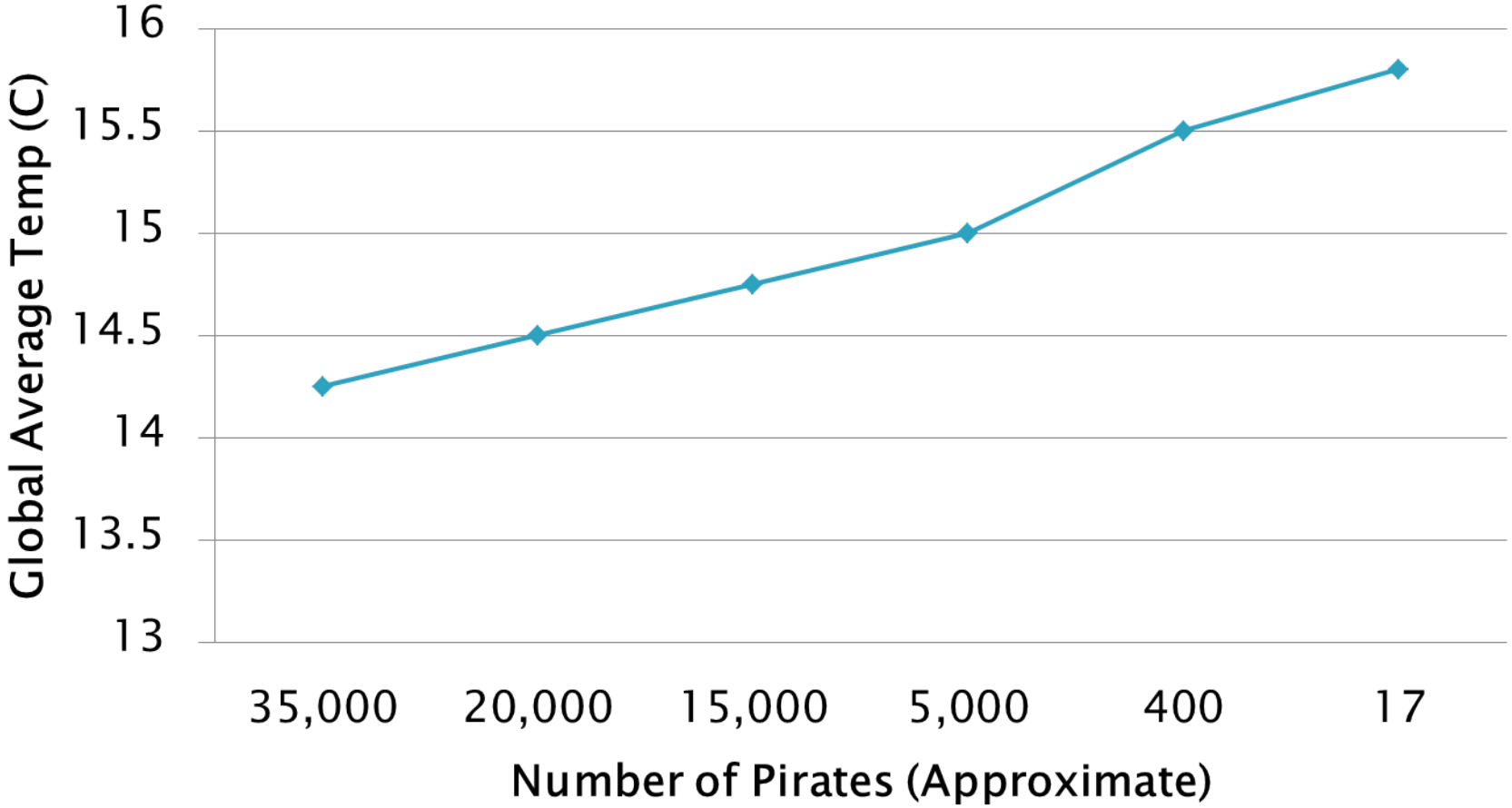
See Handout 7: Threats to Validity Glossary

What Are "Threats to Validity"?

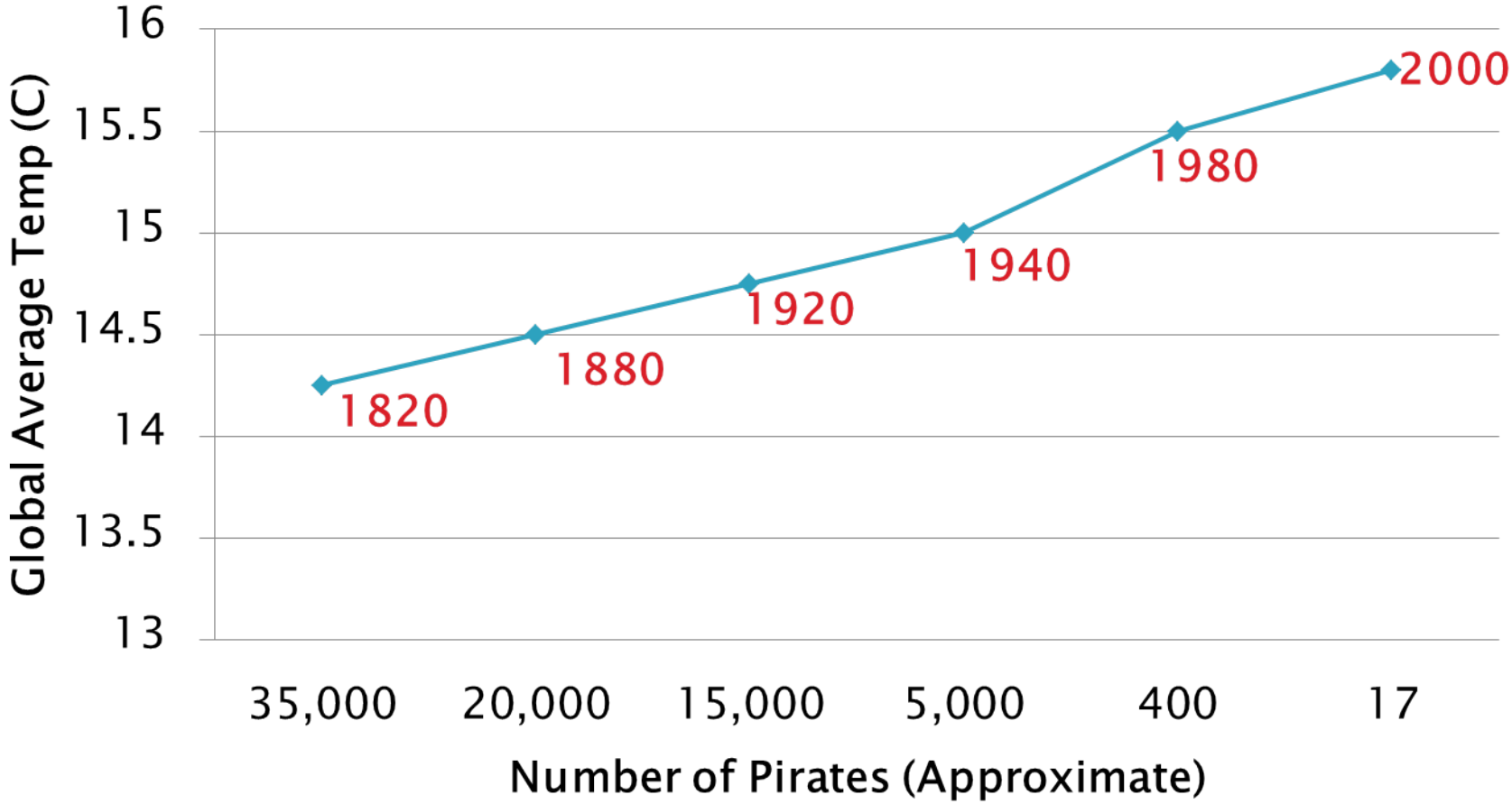
- What you can and can't say on the basis of your study
- Why is this important?
  - Can make your findings inaccurate and untrustworthy; conclusions are not valid

You think you found something, but not really because…

Global Average Temperature vs. Number of Pirates



Global Average Temperature vs. Number of Pirates



THE LESSON HERE?

Dig Deeper!

What Are the Greatest Threats?

Confounding factors

- Nonrepresentativeness
- Hawthorne effect
- History effect

Selection effects

- Maturation effect
- Regression to the mean
- Participant mortality
- Testing effect

Confounding Factors

- Are there other variables that could explain your results?

- Example: Are the students doing better on the assessments because the intervention is working, or are their gains due to other program initiatives not being studied?

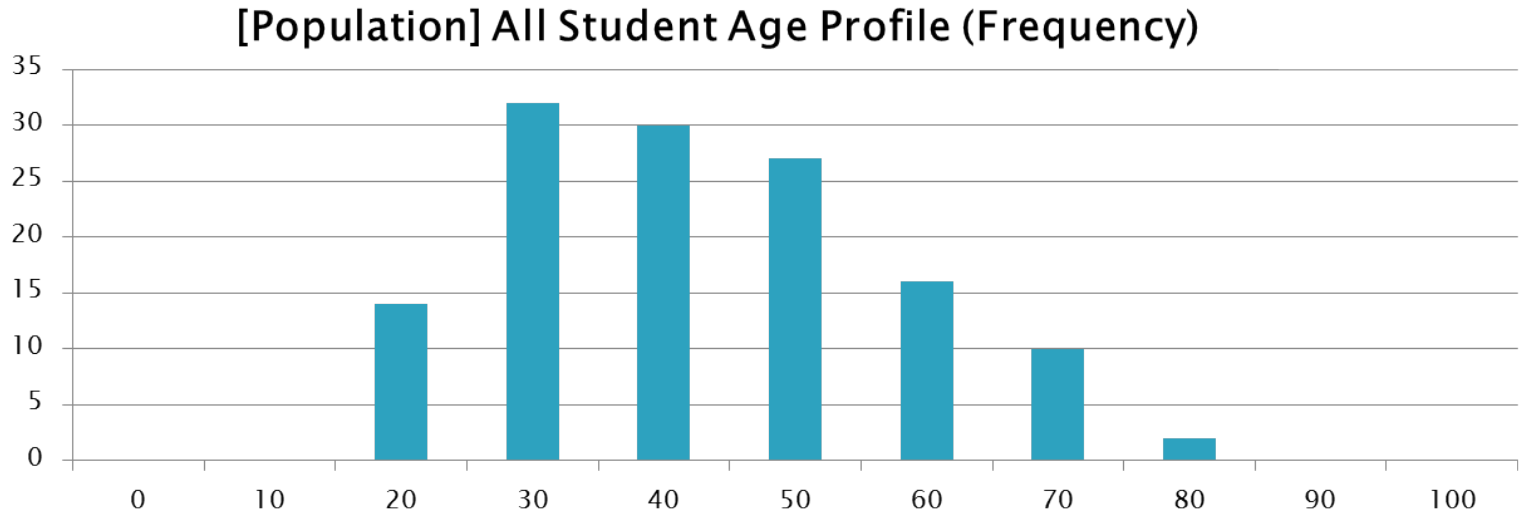
Data Display: Gapminder World

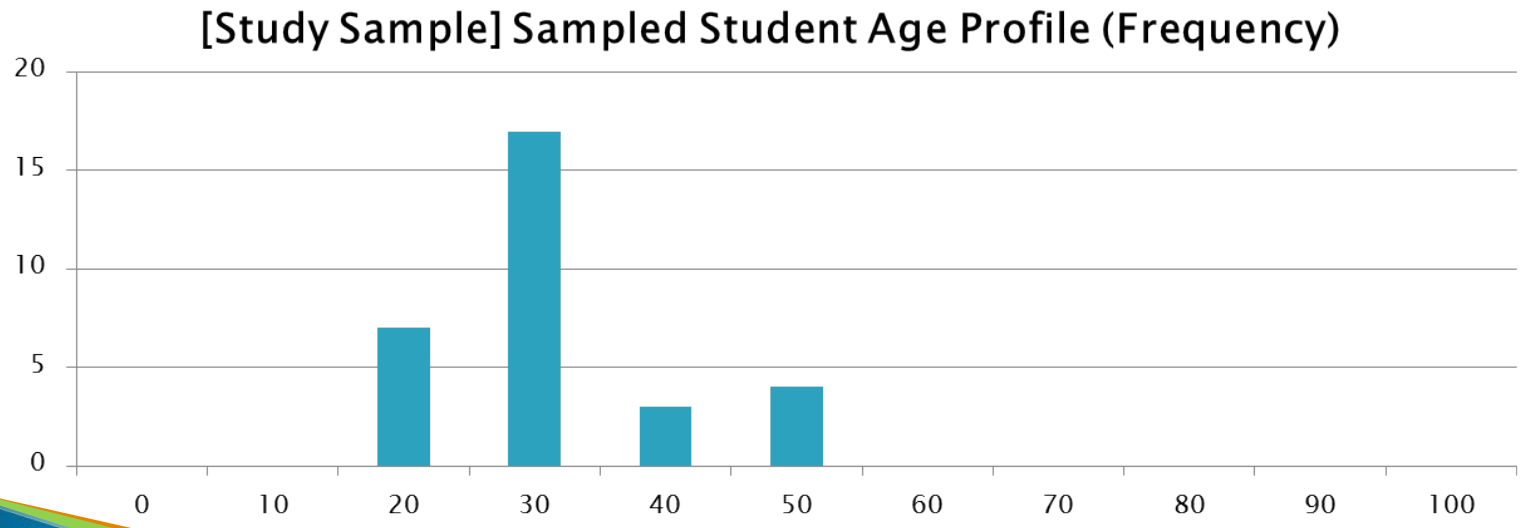
- Gapminder World (http://www.gapminder.org/) shows the world's most important trends with just a few clicks. We will use this program to show an example of what *confounding factors threat* is.

Confounding Factors: Types of Threats (1)

- **Nonrepresentativeness**
  - Are you drawing broad conclusions on the basis of very limited observations?
  - Example: You conclude that the intervention is successful and should be implemented statewide because it shows promise in one site. The one site serves mostly Spanish-speaking ESL learners.

Nonrepresentativeness





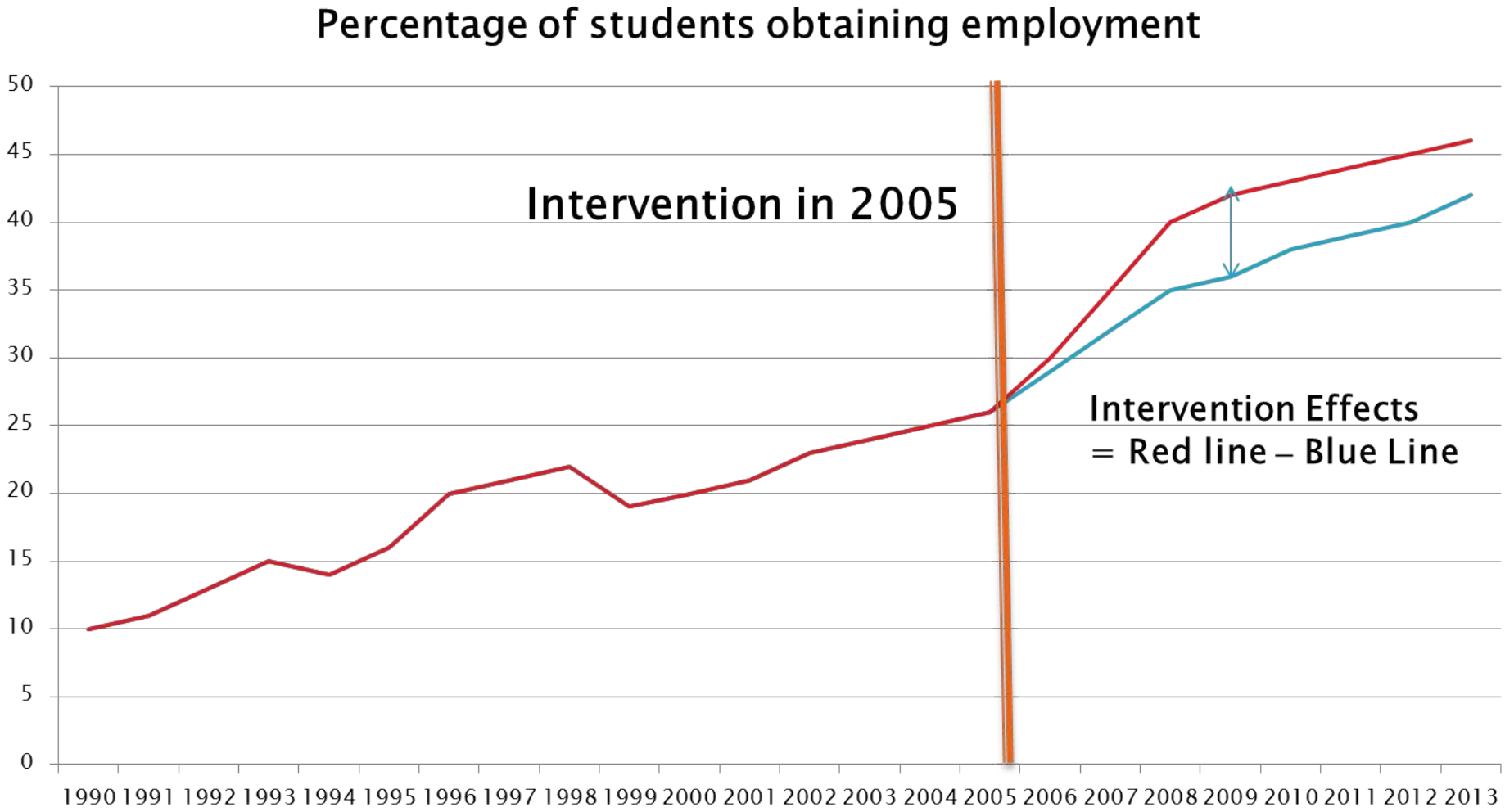
Confounding Factors: Types of Threats (2)

- **Hawthorne (observer) effect**
  - Did participants change their behavior because they knew they were being observed?
  - Example: Did the intervention really work, or did student test scores improve because once students heard that you were doing research on them and their test scores, they started coming to class more because they wanted to do well?

Confounding Factors: Types of Threats (3)

- **History effect**
  - Did things external to the study change over time affect the outcomes?
  - Example: OVAE is changing reporting requirements from "goals" to "cohorts" for long-term outcomes like employment. So an intervention to improve employment outcomes statewide will have different results once this change takes place. It would be hard to separate the effects of the intervention from the change in from whom you collected data.

History Effect



Selection Effects

- **Selection effects**
  - How were participants chosen?
  - Example: A new student counseling service was offered. Students who volunteered for counseling made greater gains than other students, but is the effect due to counseling or student factors?

Selection Bias

Examine differences between online instruction and face-to-face instruction

Student ID	Student has computer at home	Sign up for the study
1	Yes	Yes
2	Yes	Yes
3	Yes	Yes
4	Yes	Yes
5	Yes	Yes
6	Yes	Yes
7	No	No
8	No	No
9	No	Yes
10	No	No

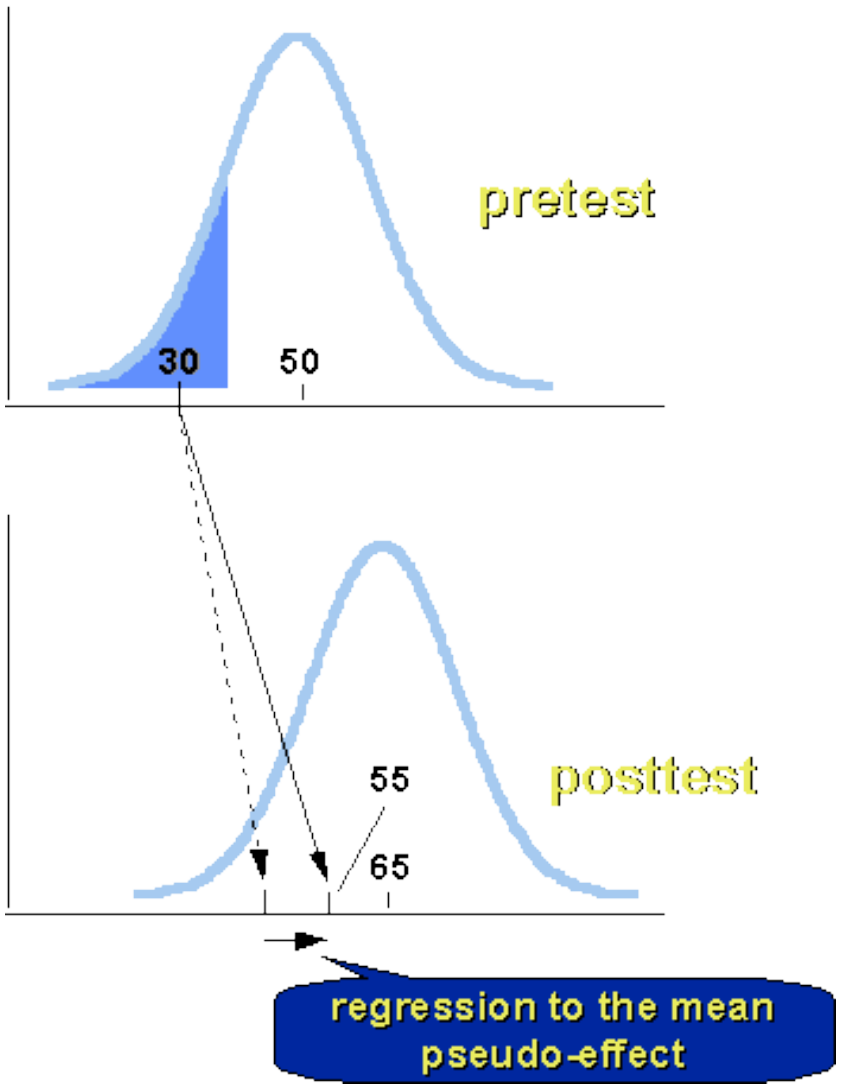
Selection Effects: Types of Threats (4)

- **Maturation**
  - Have participants matured significantly over the period of the study?
  - Example: Are students showing gains because of instruction or because of natural literacy development from interacting with print outside the classroom?

Selection Effects: Types of Threats (5)

- **Statistical Regression** ("Regression to the Mean")
  - Do the high scores seem to be dropping while the low scores seem to be increasing?
  - Example: A teacher was given the highest possible scores on the end-of-semester evaluation one semester but the next semester received scores that were still very good, but not nearly as high.

Regression to the Mean



If more students perform poorly in the sample, they tend to get a higher score in the posttest and move the mean closer to the population mean.

Selection Effects: Types of Threats (6)

- **Subject Mortality**
  - Who dropped out of the study?
  - Example: Were the only students who stayed in the class to receive the intervention the ones who could benefit most from the it (i.e., the intervention group got "creamed")? Or did the opposite happen?

Selection Effects: Types of Threats (7)

- **Testing Effect**
  - Did you use the same questions to test students as you did previously?
  - Example: Students pretested with TABE Form A should not be posttested with the same form, so that the results reflect what they've learned rather than their ability to learn how to take that particular test.

Threats to Validity Quiz

See Handout 7: Threats to Validity Glossary

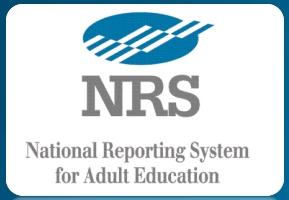
Your Threats to Validity

Apply your learning about threats to validity to your own study.

In your state teams, identify your anticipated results, any possible alternative factors that may influence these results, and strategies for controlling for these factors. Enter these in your Evaluation/Research Planner.

See Handout 4: Evaluation/Research Planner Section G

Questions and Discussion



+/Δ for Day One