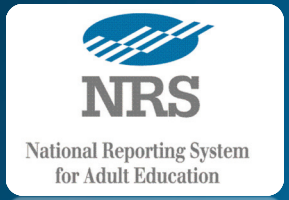
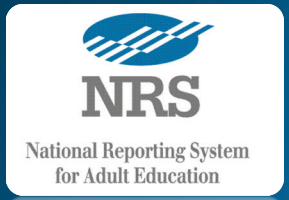
NRS Myth Busters: The Truth About Adult Education

American Institutes for Research



Day 3



Reviewing Days 1 and 2

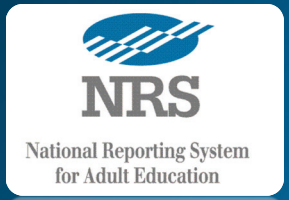
- Day 1
  - State Presentation of Topics and Plans
  - Research Planning Model
  - Procedures
  - Data Quality Issues and Threats to Validity
- Day 2
  - Presentations and Discussion with ELC Participants
  - Refining Research Questions
  - Research Design
  - Analysis, Reporting, and Sampling
  - State Planning Time

See Agenda

Day 3

- Develop Your Data Analysis Approach
- State Presentation of Plans With Feedback
- State Development of Final Plans
- Developing Your Reporting Plan
- Discussion of AIR Support

Develop Your Data Analysis Approach



Where We Are

- You know the question you want to answer
- You have the design of your study
- You have a data collection plan
- Now what?

Now, what are you going to do with the data?

What We'll Cover

- Definitions
- Pre-Analyses Data Quality Check
- Exploratory Analyses
- Formative Analyses
- Summative Analyses
- Next Steps

Definitions: Reminders

- Population = The universe; all the people you want to say something about (generalize to)
- Sample = The subset of the population that you have data on (or tried to)
- Variables = Measures or constructs (e.g., age, attendance, posttest score)

Definitions (cont'd)

Scale	Description	Examples	Statistics
Nominal	Categories, Names	Gender, Teacher	Mode, Chi-square
Ordinal	Rank or ordered categories	Grades, Satisfaction (Likert)	Median, Percentile
Interval	Distance meaningful	Temperature	Mean, Standard deviation, Correlation, Regression
Ratio	Absolute zero (zero is meaningful)	Counts (usually)	All

Don't worry about the details. Just know that you have to <u>be careful when using nominal or ordinal</u>.

Pre-Analyses Data Quality Check

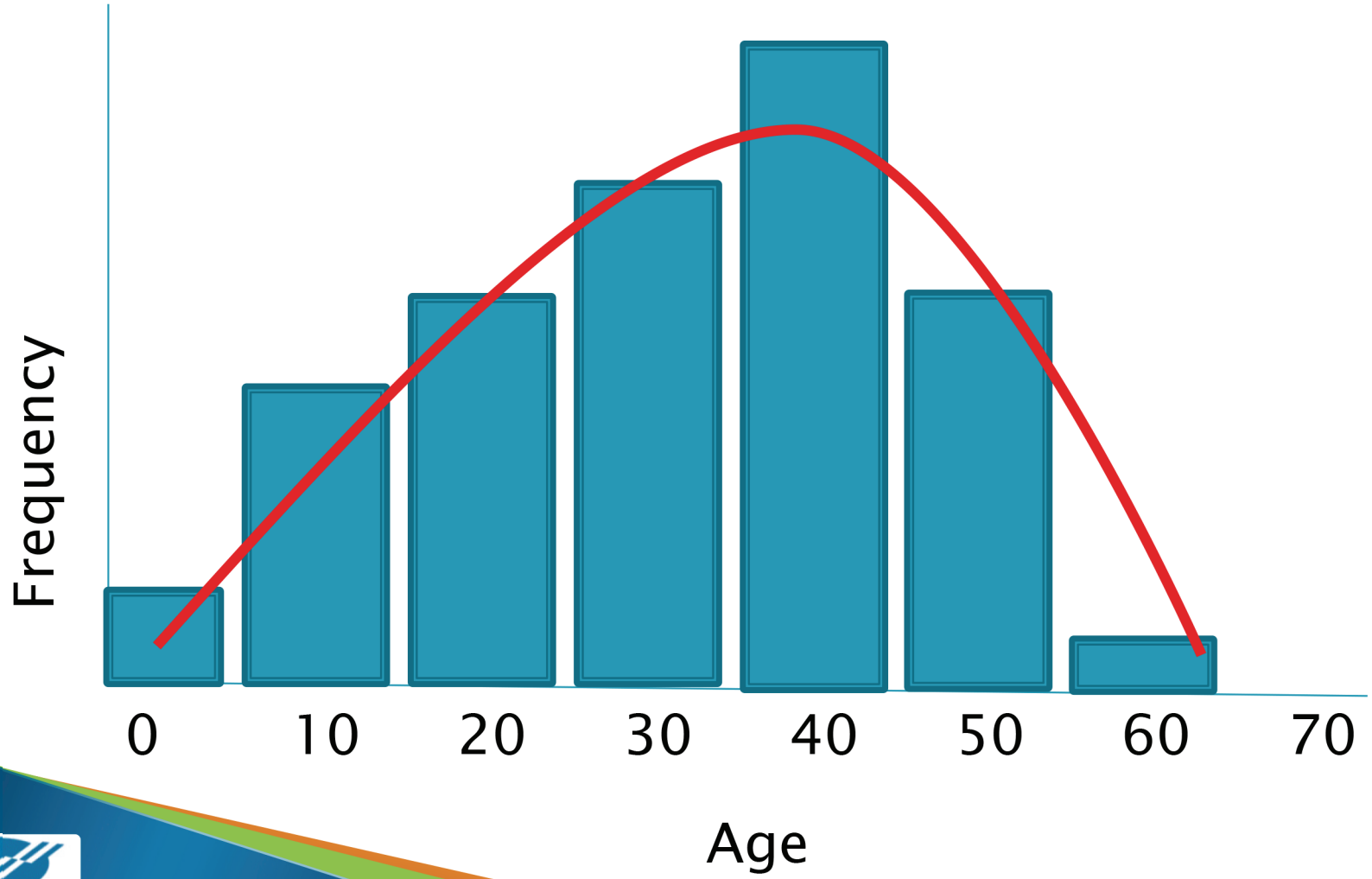
- Why?
  - See whether something is wacky
- Who should do this?
  - Everyone using numbers
- What do you do?
  - Descriptive statistics on <u>all</u> variables
  - Missing data check

Descriptive Statistics

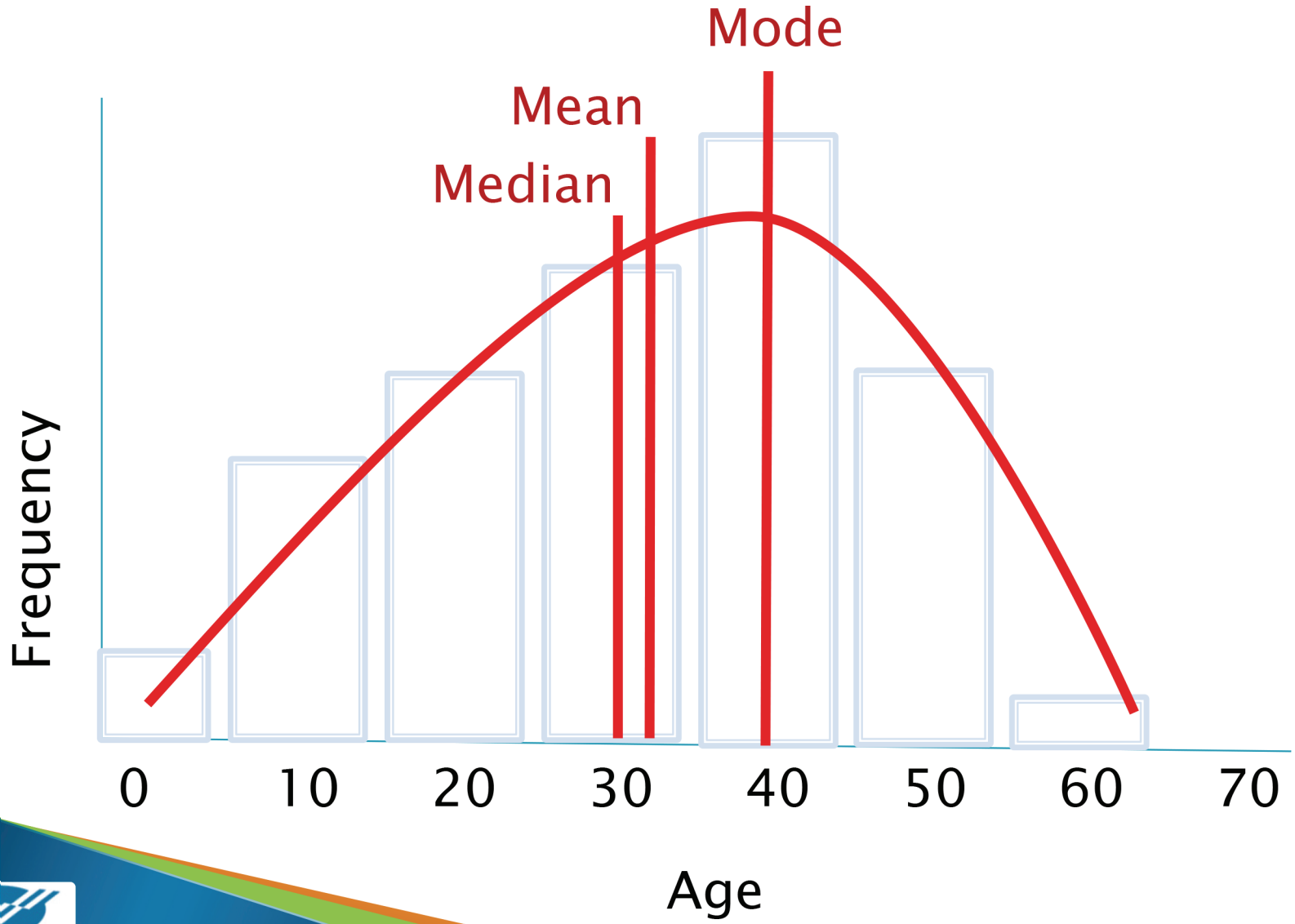
- If you run descriptive statistics, you will likely get:
  - Mean = Average
  - Mode = Most frequent
  - Median = Middle
  - Range = Low and high values
  - Standard deviation = Average distance from mean
  - Frequency distribution (option)

Descriptive Statistics

Frequency Distribution = How many at each level?



Descriptive Statistics



Data Quality Check

- Look at the descriptive data or a frequency graph and ask:
  - Does the range look right? Are there numbers that are too high or too low to be possible?
  - Does each average (mean) make sense and fit with what you know?
  - Are the “counts” right? How many missing data points? How was missing data coded?

Sample output for "descriptive statistics"

	Years of Education
Mean	8.1
Standard Error	5.23121
Median	3
Mode	2
Standard Deviation	16.54254
Sample Variance	273.6556
Kurtosis	9.789742
Skewness	3.117072
Range	54
Minimum	1
Maximum	55
Sum	81
Count	10

When things don't look right, scan the raw data

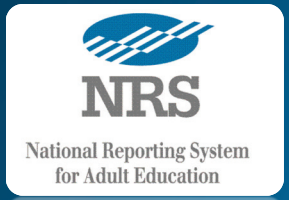
Raw Data
2
2
5
5
4
3
1
55
1
3

Years of Education	
Mean	8.1
Standard Error	5.23121
Median	3
Mode	2
Standard Deviation	16.54254
Sample Variance	273.6556
Kurtosis	9.789742
Skewness	3.117072
Range	54
Minimum	1
Maximum	55
Sum	81
Count	10

Software and Missing Data

- In Excel, blanks are excluded (non-zero)
  - Issue: Make sure blanks are not meant to be "zeros"
- SPSS/SAS
  - Will generally leave blanks out of analyses
  - Can be programmed to exclude coded missing data
  - Can be programmed to provide estimates for missing data
- Missing data means less power

Your turn.
Run descriptive statistics.



See Sample Analyses in Excel

Example 1 Instructions

Go to the Excel file, Example 1

- Go to the "Data" tab → "Data Analysis"
- Click "Descriptive Statistics" and OK
- For "input" box, select <u>all the data & headers</u>
- Click grouped by "columns"
- Click "labels in first row"
- Click "new worksheet ply" and fill in "Ex1"
- Click "summary statistics" and OK
- Go to the tab labeled "Ex1"

Example 1

- What do you see?
- Which data look clean and which do not?
- What are some of the issues?

Analysis and Reporting

- Method for interpreting the data and answering the research questions
- Are descriptive:
  - Frequency tables, charts
  - Means, standard deviations
- May include results of statistical tests
  - Correlations
  - Regression results, comparison test
- Methods depend on design

Interpretation Strategies

- Answer your question
- Use appropriate statistics
- Don't go beyond the data
  - Avoid explanation without data support…("This must be because…")

Interpretation Strategies

- Consider data quality

- Look for patterns and differences
  - Disaggregate data
  - Look for extremes
  - Don’t discount unexpected findings
  - Remember serendipity

Think Ahead…

Research is rarely conclusive

- What to do about negative or nonresults
- You'll probably have more questions than when you started
- Consider how you will build on what you've learned to learn more

Exploratory Analyses

- Why?
  - Goal = Explore the data
  - Broad, more open-ended questions
  - No narrow question or hypothesis to test
- What do you do?
  - Look at trends over time
  - Look for relationships in the data
  - Disaggregate the data
- Who should do this?
  - Those who simply want to learn more and are okay with possibly going down a misleading path; those <u>not</u> testing a hypothesis or seeking conclusive lessons

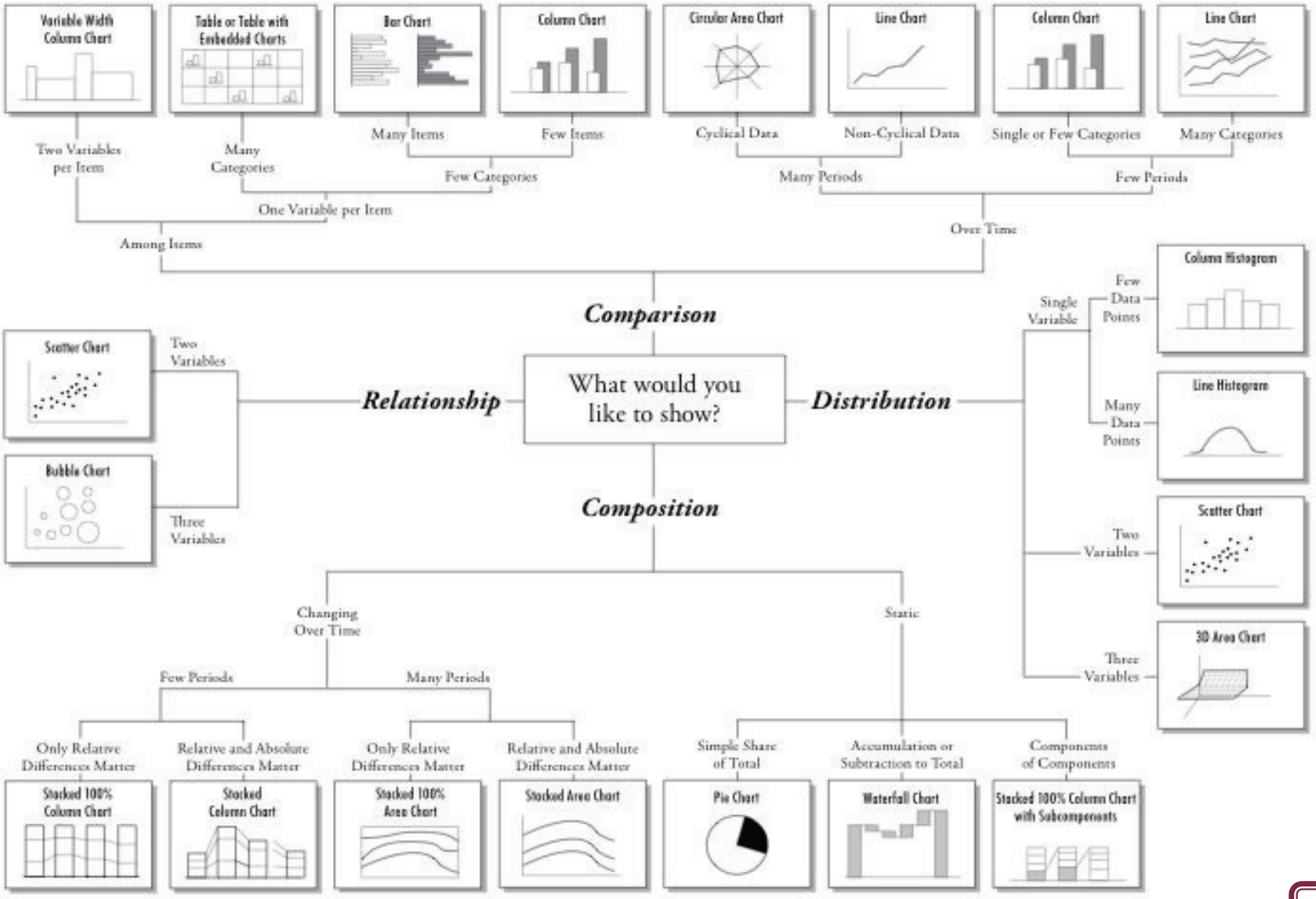
Exploratory Analyses

- Graphing
- Exploratory Correlations
- Exploratory Regressions
- Qualitative Analyses

Graphing

- You all know this already!
- Some quick resource reminders…

Chart Suggestions—A Thought-Starter



- *http://extremepresentation.typepad.com/blog/2006/09/choosing_a_good.html*

A PERIODIC TABLE OF VISUALIZATION METHODS

Data Visualization
Visual representations of quantitative data in schematic form (either with or without axes)

Information Visualization
The use of interactive visual representations of data to amplify cognition. This means that the data is transformed into an image, it is mapped to screen space. The image can be changed by users as they proceed working with It

Concept Visualization
Methods to elaborate (mostly) qualitative concepts, ideas, plans, and analyses.

Strategy Visualization
The systematic use of complementary visual representations in the analysis, development, formulation, communication, and implementation of strategies in organizations.

Metaphor Visualization
Visual Metaphors position information graphically to organize and structure information. They also convey an insight about the represented information through the key characteristics of the metaphor that is employed

Compound Visualization
The complementary use of different graphic representation formats in one single schema or frame

C continuum																	G graphic facilitation
Tb table	Ca cartesian coordinates											Me meeting trace	Mm metro map	Tm temple	St story template	Tr tree	Ct cartoon
Pi pie chart	L line chart											Co communication diagram	Fp flight plan	Cs concept sceleton	Br bridge	Fu funnel	Ri rich picture
B bar chart	Ac area chart	R radar chart cobweb	Pa parallel coordinates	Hy hyperbolic tree	Cy cycle diagram	T timeline	Ve venn diagram	Mi mindmap	Sq square of oppositions	Cc concentric circles	Ar argument slide	Sw swim lane diagram	Gc gantt chart	Pm perspectives diagram	D dilemma diagram	Pr parameter ruler	Kn knowledge map
Hi histogram	Sc scatterplot	Sa sankey diagram	In information lense	E entity relationship diagram	Pt petri net	Fl flow chart	Cl clustering	Lc layer chart	Py minto pyramid technique	Ce cause-effect chains	Tl toulmin map	Dt decision tree	Cp cpm critical path method	Cf concept fan	Co concept map	Ic iceberg	Lm learning map
Tk tukey box plot	Sp spectogram	Da data map	Tp treemap	Cn cone tree	Sy system dyn./ simulation	Df data flow diagram	Se semantic network	So soft system modeling	Sn synergy map	Fo force field diagram	Ib ibis argumentation map	Pr process event chains	Pe pert chart	Ev evocative knowledge map	V Vee diagram	Hh heaven 'n' hell chart	I infomural

Click each cell on website to see examples of graphs: http://www.visual-literacy.org/periodic_table/periodic_table.html#

Advanced Data Presentations

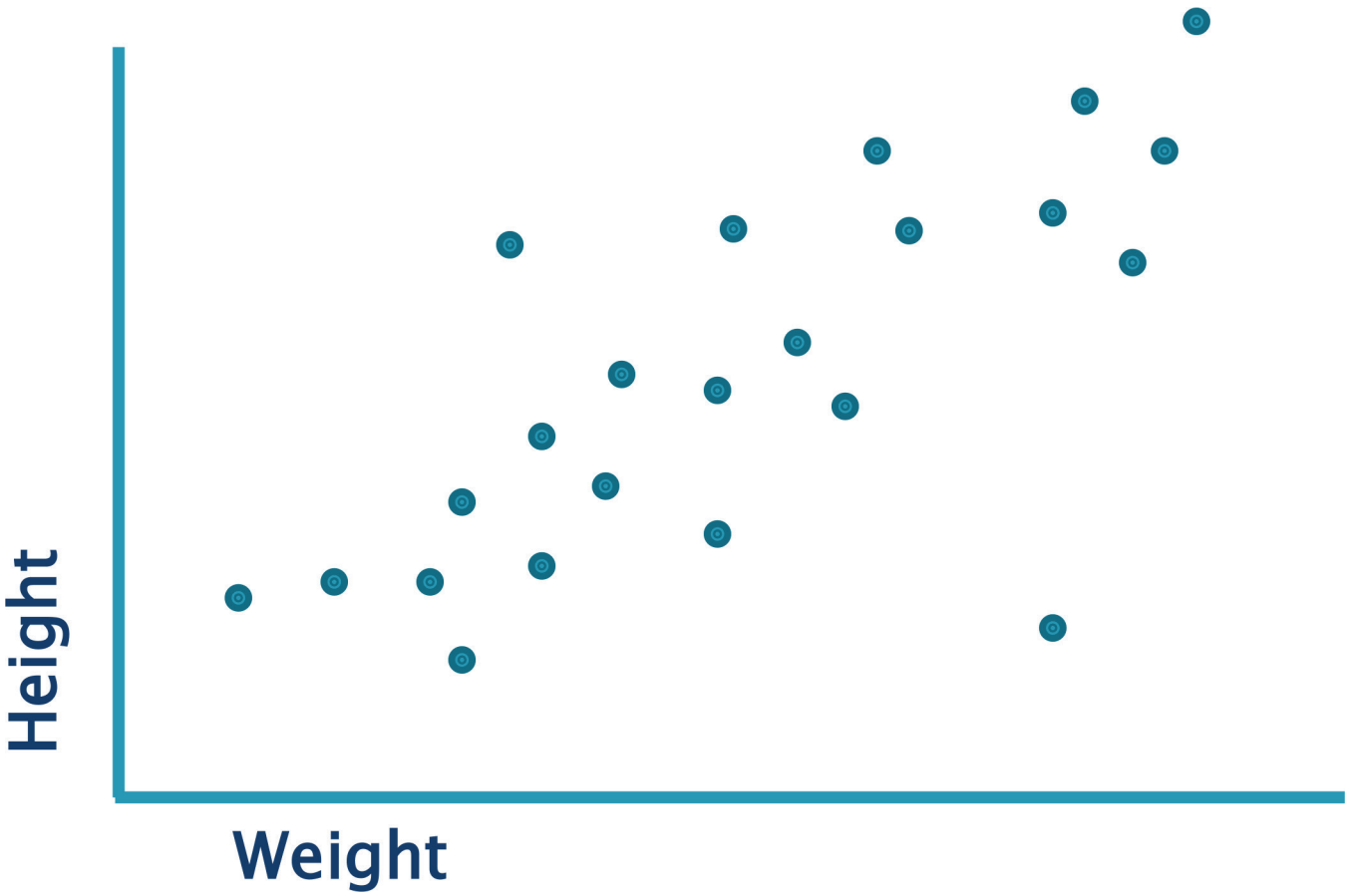
- There are more advanced presentation tools on the Internet
- Some require larger data sets and skills to use
- Some include large data sets
- You have seen Gapminder
  - http://www.gapminder.org/
- Wolfram-Alpha
  - http://www.wolframalpha.com/tour/examples.html
- Google Data Explorer
  - http://www.google.com/publicdata/directory
- BIME
  - http://www.bimeanalytics.com/showcase.html

See Handout 11: Advanced Data Presentation Tools

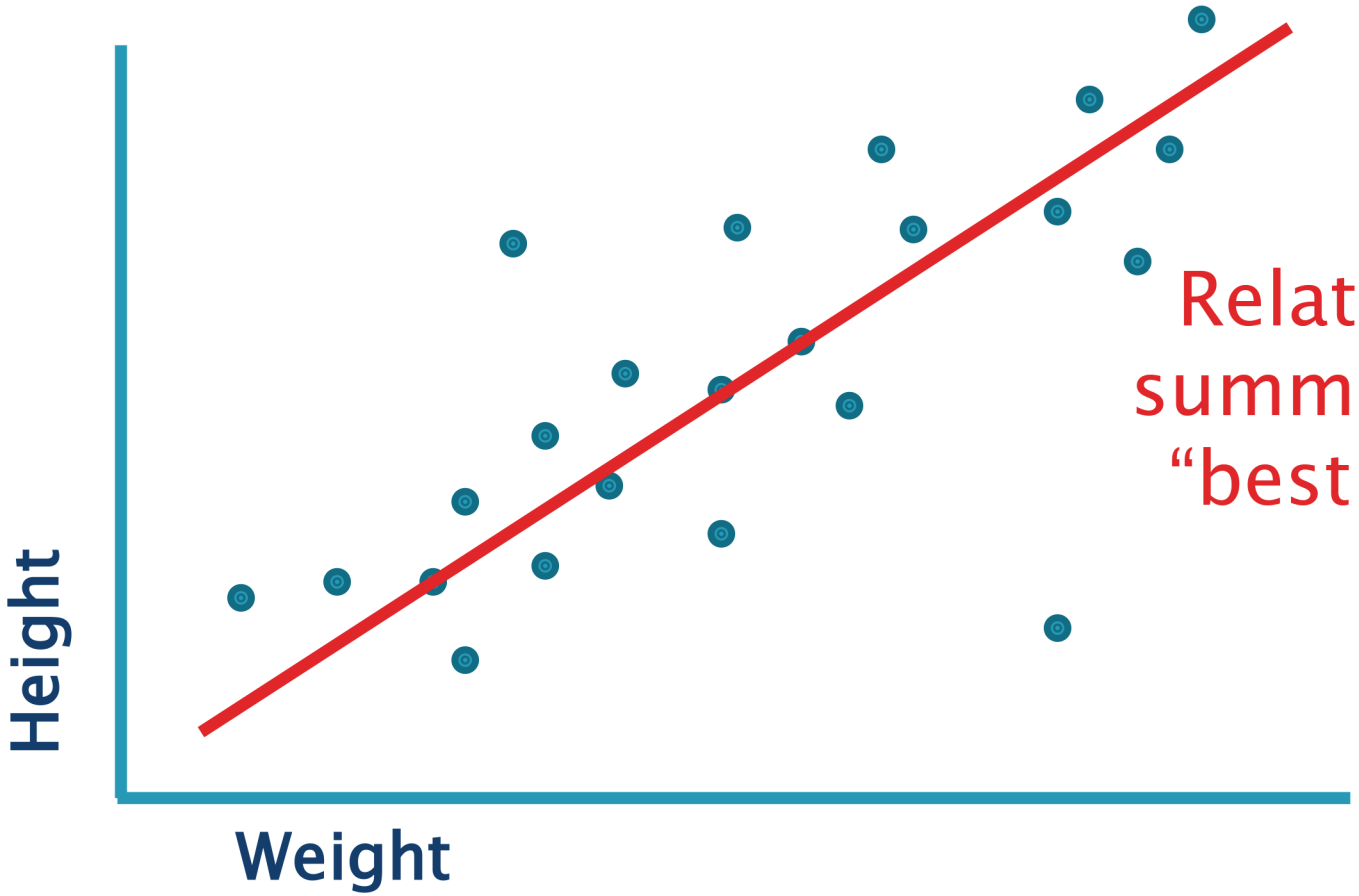
Correlations

- A correlation is a single number that describes the degree of relationship between two variables.
- It is one of the most common and most useful statistics.

Correlation Example Graph (1)

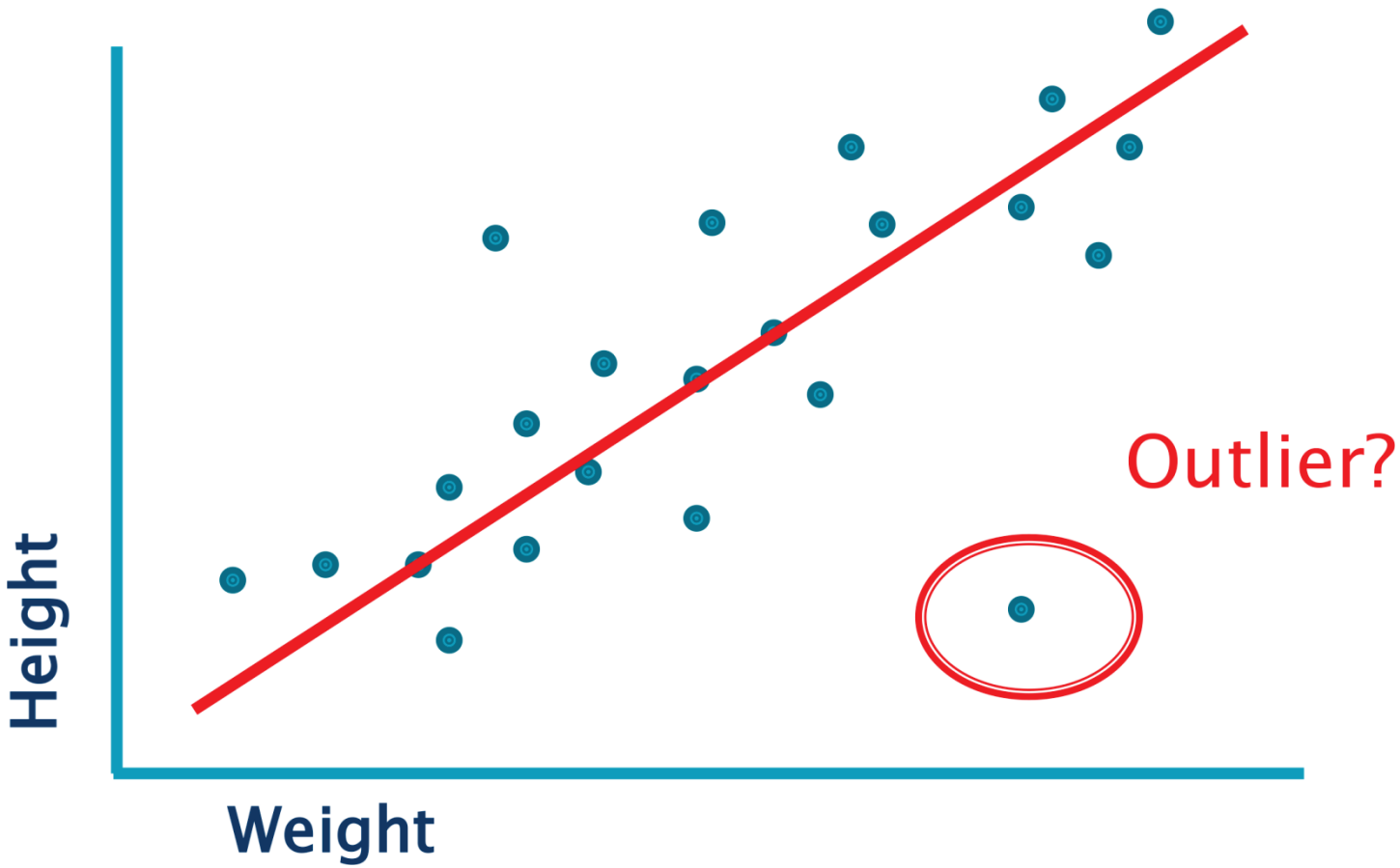


Correlation Example Graph (2)

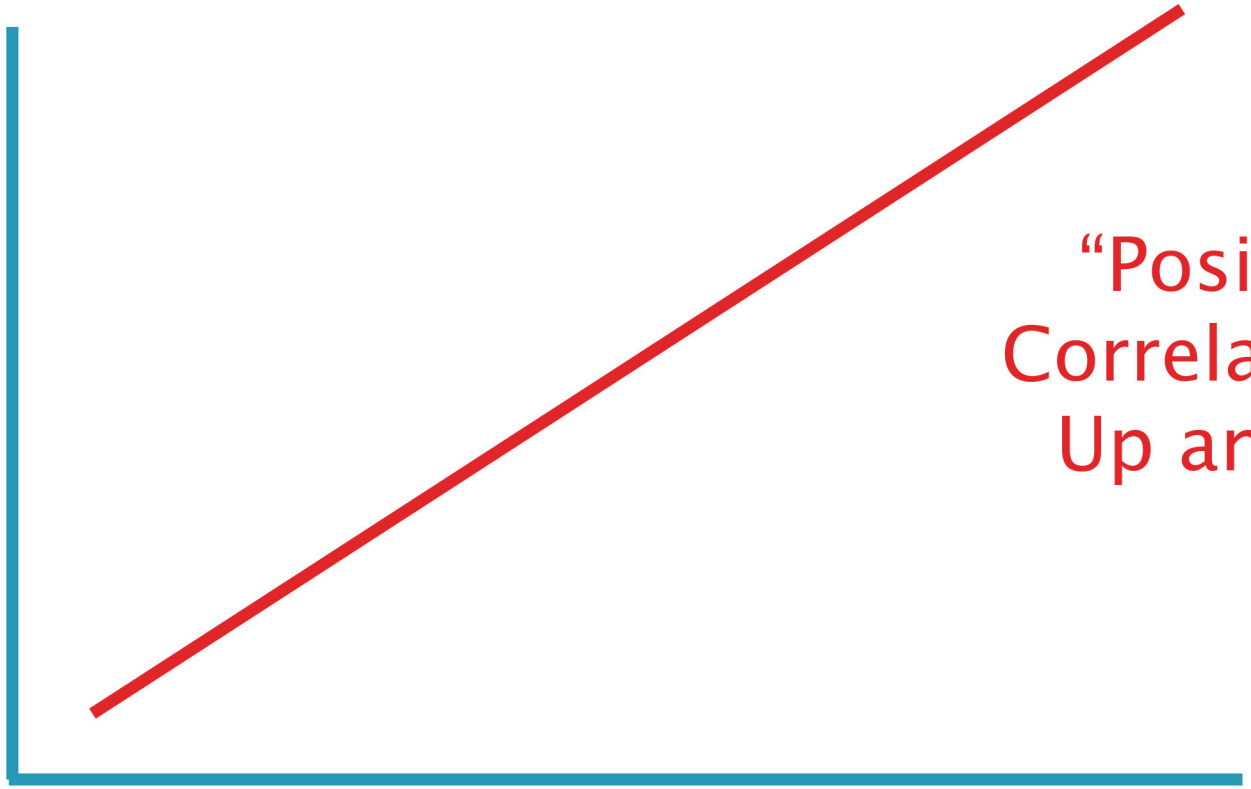


Relationship summarized in "best fit" line

Correlation Example Graph (3)



Correlation Example Graph (4)



"Positive" Correlation = Up and Up

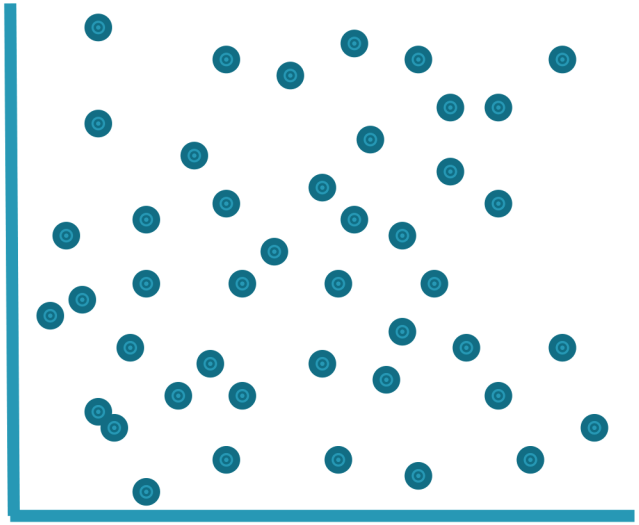
Correlation Example Graph (5)

"Negative"
Correlation =
Up and Down

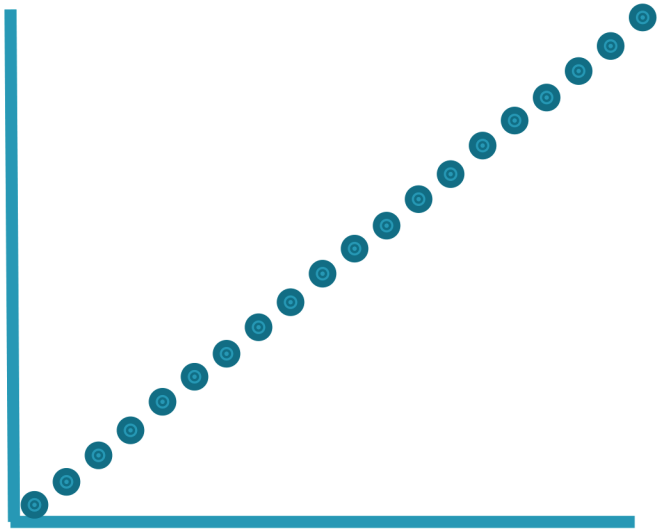
More Correlations

- Score ranges from 0 to 1 (or –1)

0 = no correlation



1 = perfect (positive) correlation



$-0.8 > r > +0.8$ = strong correlation

Your turn.
Run a correlation.

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See Sample Analyses in Excel

Example 2: Instructions

Go to the Excel file, Example 2

- Go to the "Data" tab → "Data Analysis"
- Click "Correlation" and OK
- For "input" box, select (1) age, (2) pretest score, (3) posttest score and their headers
- Click grouped by "columns"
- Click "labels in first row"
- Click "new worksheet ply" and fill in "Ex2"
- Go to the tab labeled "Ex2"

See Sample Analyses in Excel

Example 2

- What do you see?
- How high are the correlations?
- How are you interpreting them?

Qualitative

See Handouts

- 1. Typology
- 2. Taxonomy
- 3. Constant Comparison/Grounded Theory
- 4. Analytic Induction
- 5. Logical Analysis/Matrix Analysis
- 6. Quasi-statistics
- 7. Event Analysis/Microanalysis
- 8. Metaphorical Analysis
- 9. Domain Analysis
- 10. Hermeneutical Analysis
- 11. Discourse Analysis
- 12. Semiotics
- 13. Content Analysis
- 14. Phenomenology/Heuristic Analysis
- 15. Narrative Analysis

See Handout 12: Qualitative Analysis

Break

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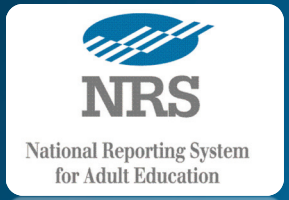
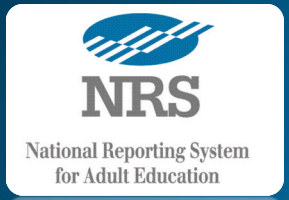
State Report Out on Updated Plans

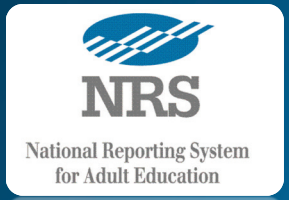


See Handout 13: State Feedback Form

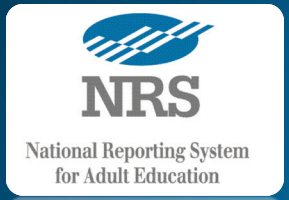
Lunch



State Work on Final Plans



Developing Your Reporting Plan



The Reporting Plan

- Levels of Audiences
- Messages and Medium
- Content
- Management

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Levels of Audience

- Essential or core audience = “The One”
- Design your reporting to meet the needs of your core audience
- AFTER addressing your core audience, prioritize secondary audiences

- Who is your core audience?

- If you had only <u>one sentence</u> to say to <u>one person</u> about this study, what would you say to whom?

- Who is your core audience? (cont'd)

- **What one picture (data evidence) would you give to support your sentence?**

Messages

- What you want your audience to remember
- No more than three points per audience
- May include (or imply) desired action steps
- Format might be:
  - Summary point
  - (Additional) data to support point
  - Action based on data

Messages: Example

Summary point:

- Our innovative, pilot PD program worked.

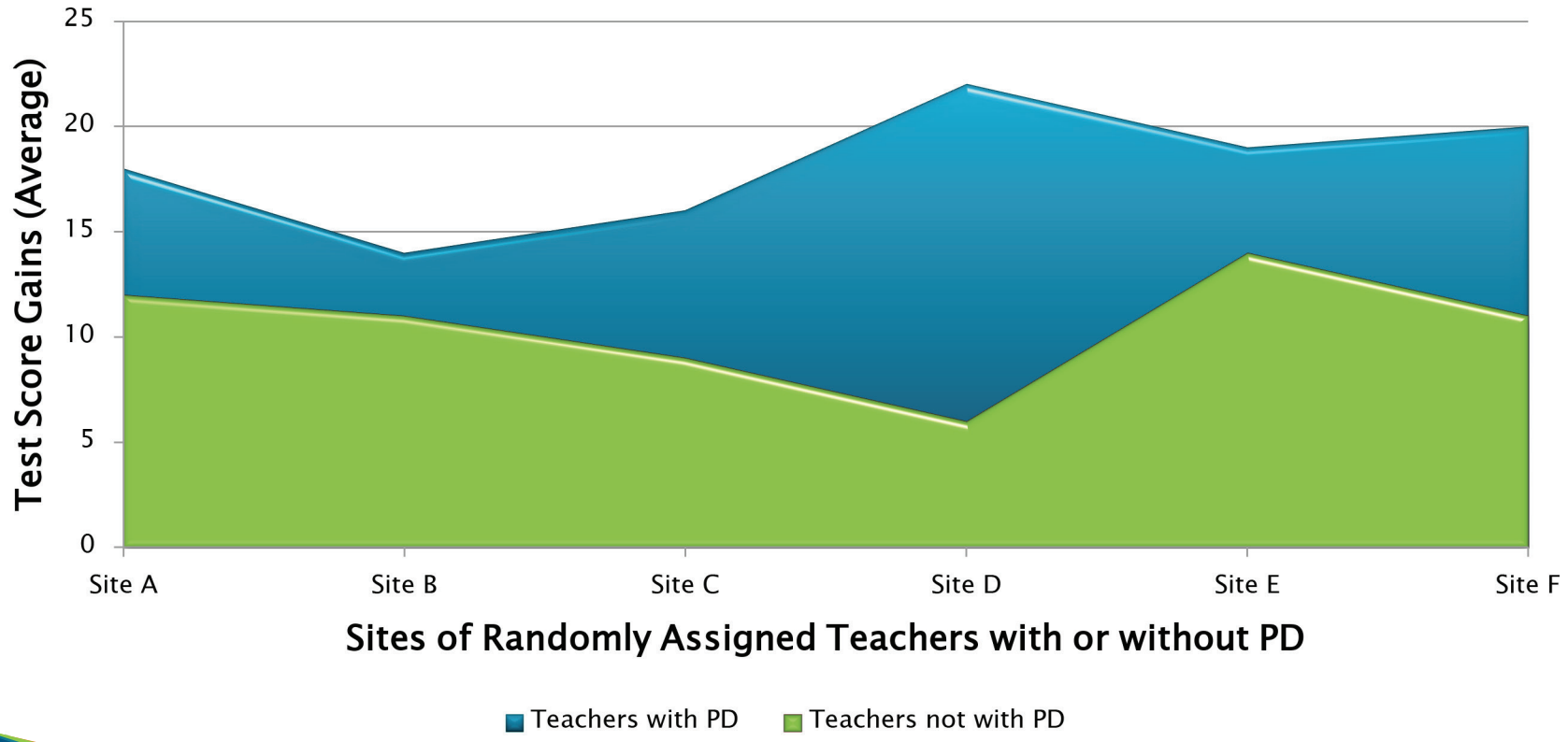
Data to support point:

- Students of teachers in our PD program showed twice the rate of retention and completion.

Action based on data:

- With similar results in half of our state's adult education sites, we could double our completion rate in two years.

Messages: Example



Medium

Types of “final reports” include:

- Research papers
- Memos
- Policy briefs
- Brochures
- PowerPoint presentations
- YouTube videos

Content

- Traditional Research paper content includes Abstract, Research Questions, Methods (Design, Data Collection and Analysis), Results, Discussion, Limitations, and Conclusions
- Your content should be audience and media driven: YouTube content will look very different from a research paper.
- Even in research papers, don't be afraid to lead with the conclusion!

Good Practice

- In <u>any</u> medium, make sure to include:
  - Basic methods and data sources (when the data were collection, how, and from where)
  - Limitations of the data
  - Your contact information in case people have questions or want to replicate your findings (data available to the public)

Management

- Lead
  - Who is the person taking responsibility for the report or each piece?
  - Write it as you are doing it (methods, etc.)
- Timeline and Drivers
  - Schedule backed out from end points
  - Drivers or milestones (e.g., schedule a statewide presentation)
  - How often will you meet to assess progress?
- Quality Control and Approvals
  - Who is the QC reviewer? (Outside partner?)
  - Who else needs to approve the report? Who are the organizational, political, community partners?

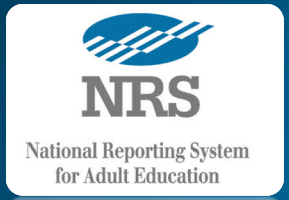
Reporting Plan Exercise

Refer to Handout 14.

As a state team, consider your core audience, messages, media, content, and the process for completing this report at the end of your study. Complete the template and be prepared to share your ideas.

See Handout 14: Reporting Plan Template and
Handout 4: Evaluation/Research Planner Section H

Wrap Up/Summary



Reminders

- Answer your question.
- Look for patterns and differences.
- Use appropriate data and statistics.
- Disaggregate the data.
- Be transparent about and note data quality.
- Draw appropriate conclusions.
- Remember serendipity.

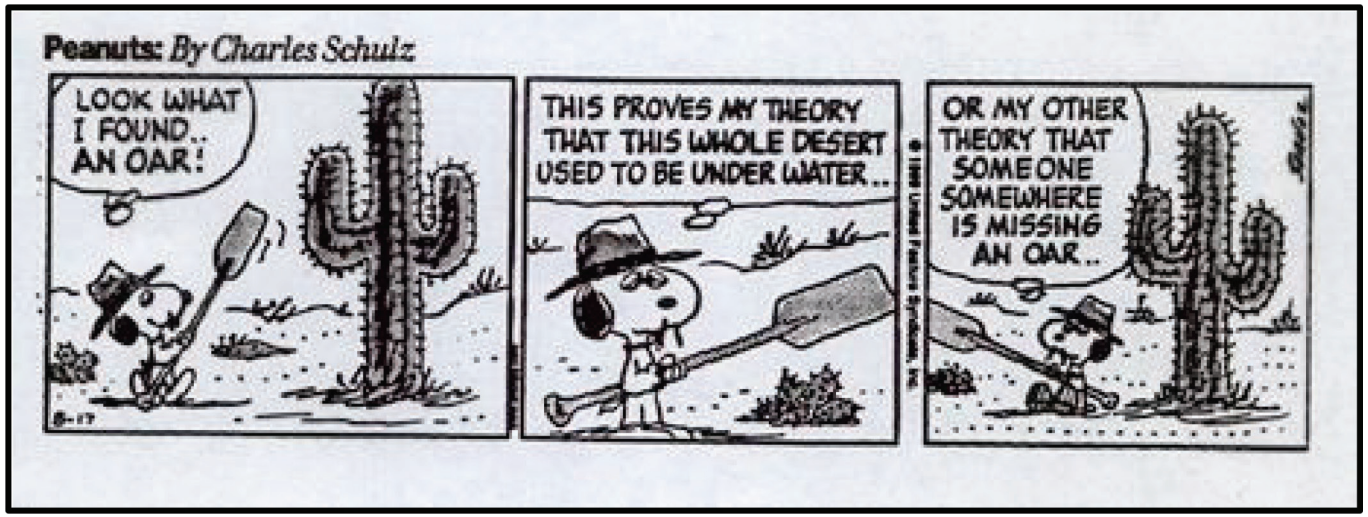
Discussion of Support

- Follow-up Webinar
- Other Sources of Support
  - Researchers
  - University colleagues

Support

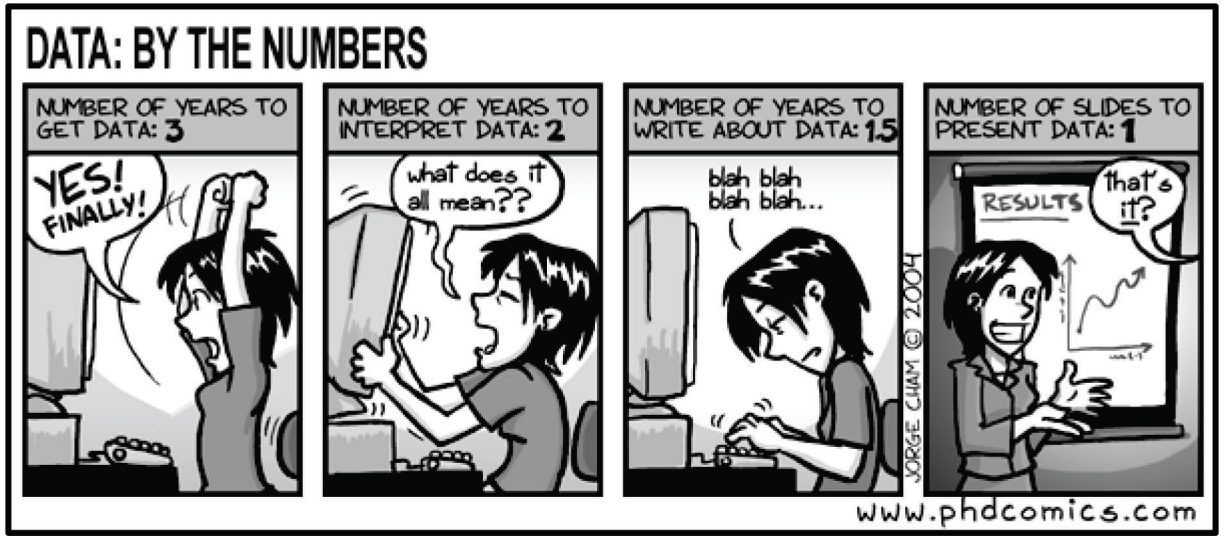
- What kinds of ***support*** do you need?
  - Finalizing the research question?
  - Identifying data collection processes and sources?
  - Methodology?
  - Data analysis?
- What kinds of additional ***training*** do you need?

A little fun for the journey home ☺



Remember to think of alternative explanations …

…and make that slide AMAZING!



Safe Journey Home!