STATISTICAL LITERACY and
STATISTICAL COMPETENCE in the
21ST CENTURY

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• THE ENVIRONMENT

• THE NEW LITERACY

• THE NEW COMPETENCE

• THE NEW PROFESSIONALISM
THE ENVIRONMENT

• The intellectualizing of work

⇒ Need analytical, quantitative, computing skills

⇒ Need interpretive, communication skills

⇒ Multiple jobs, multiple careers

⇒ Need statistical skills?

• The democritization of education

⇒ More in college, more taking statistics

⇒ Often employed, career focus

⇒ Want visible utility
THE ENVIRONMENT

• Pressures on education

⇒ We cost too much

⇒ Room for competition

⇒ Technology-based learning

⇒ Student background and motivation?

• A changing discipline

⇒ Technology

⇒ Back to data, back to science

⇒ Interdisciplinary emphasis
THE ENVIRONMENT

• Technology

⇒ Drives demand for quantitative skills

⇒ The young are fluent

⇒ New content emphases

⇒ New learning tools: The next big change?

⇒ Enables competition

⇒ The information flood: No global village
THE NEW STATISTICAL LITERACY

• Think broadly

⇒ Strategies and big ideas (details automated)

⇒ Communication and problem-solving

⇒ Filters for nonsense

• Strategies: an example

PLOT YOUR DATA

⇒ INTERPRET WHAT YOU SEE

⇒ NUMERICAL SUMMARY?

⇒ MATHEMATICAL MODEL?
• Big ideas: some examples

⇒ Data beat anecdotes

⇒ Is this the right question?

⇒ Beware the lurking variable

⇒ Association is not causation

⇒ Observation versus experiment

⇒ The importance of study design

⇒ The omnipresence of variation

⇒ Conclusions are uncertain

• Is this a stat course?
THE NEW STATISTICAL COMPETENCE

• Use sophisticated tools gracefully

• Keep thinking broadly

• What can’t be automated?

• Statistical thinking (ASA/MAA)
  ⇒ The need for data
  ⇒ The importance of data production
  ⇒ The omnipresence of variability
  and . . .
The quantification and explanation of variability

- Randomness and distributions
- Patterns and deviations (fit and residual)
- Mathematical models for patterns
- Model-data dialog (diagnostics)

- This is serious stuff

- One pass through software isn’t enough
- Understanding chance variation
- Models as interpretive tools

- But you can choose the details to fit your context
SOME HESITATIONS

• Is this utopian?

⇒ No one ever went broke by underestimating the motivation of The American Freshman

⇒ Costs, competition, …

• Does statistics retain a core?

⇒ Is quantitative literacy our turf?

⇒ Is any specific competence shared?

⇒ Why instruction separate from a context in another field?

⇒ Why instruction separate from broader information science?