Feb 6th, 2:55 PM - 4:10 PM

Quantitative Reasoning for the Social Science Classroom

Maria Aysa-Lastra
Winthrop University, aysalastram@winthrop.edu

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Maria Aysa-Lastra
Department of Sociology and Anthropology
College of Arts and Sciences
Winthrop University

Learning Goals

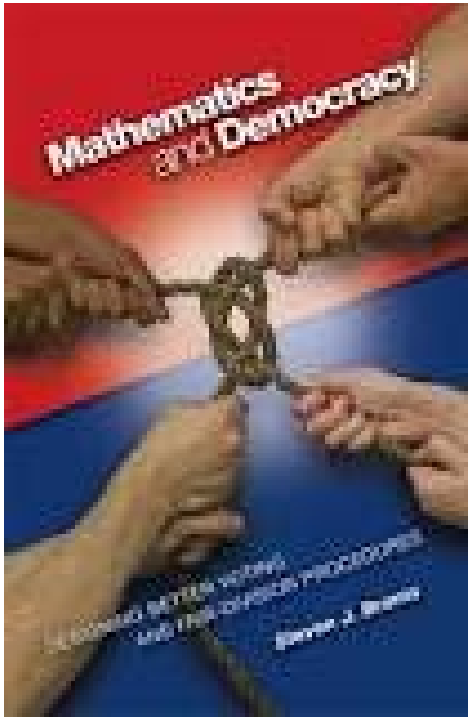
- Bloom's Domains of Learning
  - Psychomotor
  - Cognitive
    - Lower Order Thinking Skills
      - Remembering
      - Understanding
      - Applying
    - Higher Order Thinking Skills
      - Analyzing
      - Evaluating
      - Creating
  - Affective

Quantitative Literacy Rubric

- Association of American Colleges and Universities
  - *Interpretation*
  - Representation
  - Calculation
  - Application/Analysis
  - Assumptions
  - Communication

Quantitative Literacy Rubric

- *Mathematics and Democracy,* (Steen et al. 2001: 8-9):
  - ***Confidence with Mathematics***
  - Cultural Appreciation
  - ***Interpreting Data***
  - ***Logical Thinking***
  - Making Decisions
  - ***Mathematics in Context***
  - ***Number Sense***
  - Prerequisite Knowledge
  - Symbol Sense



Quantitative Literacy Rubric

- "The foremost objective of both liberal and professional types of higher education should be to produce well-educated, enlightened citizens, who can ***reason cogently, communicate clearly, solve problems, and lead satisfying, productive lives***." (Mathematical Association of America 1998)
- Citizens who cannot properly interpret quantitative data are, in this day and age, ***functionally illiterate***." (Mathematical Sciences Education Board 1990 cited in Scheaffer 1990)

Other important advantages

- QR essential for social justice
- Data analysis skills help build connections between mathematics and other subjects in the college curriculum and to the world outside of the classroom.
- For example:
  - Data on quality of life and mortality
  - Data on social networks and crime
  - Data on race, age and gender and voting patterns
  - Data on industrial quality, productivity and wages

US vs other developed countries OECD data on QR (2013)

- Survey of Adult Skills
  - Numeracy
- Adults (16-65)
  - Highest scores: Japan, Finland, and Belgium
  - Lowest scores: United States, Italy and Spain
- Young adults (16-24)
  - Highest scores: Finland, the Netherlands, and Korea
  - Lowest scores: Italy, Cyprus, and the United States.

National Efforts

- National Numeracy Network (NCED)
- SIGMAA QL (MAA)
- SSDAN – NICHE (NSF)
- In sociology, the *Liberal Learning and the Sociology Major* (2004) guidelines include a recommendation for quantitative literacy in the sociology major.

Best Practices for Teaching QR

- Real world applications & active learning
- Pairing QR instruction with writing and critical reading
- Using technology
- Collaborative instruction and group work
- Pedagogy that is sensitive to differences in students' culture and learning styles
- Scaffolding the learning process and providing rich feedback and opportunities for revision.

Useful to know about numbers

- Having a sense of magnitude
  - ONE TRILLION DOLLARS
- Aptitude Tests for job candidates
  - Numerical Reasoning

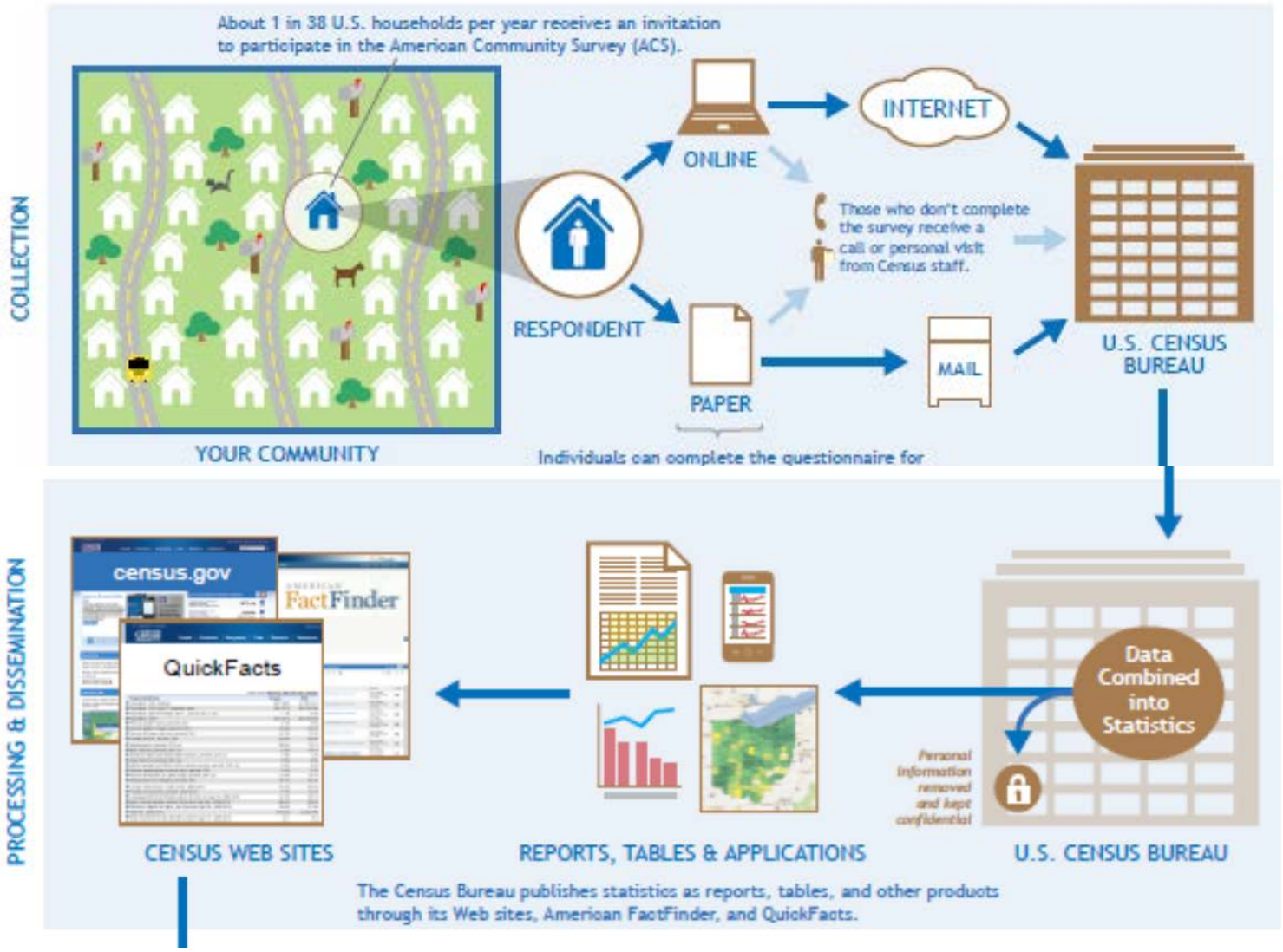
Online Resources

- US Data
  - FedStats
  - American FactFinder
  - Census Explorer
  - CDC-Data and Statistics
  - CDC –WISQARS
  - Death Penalty Information Center
  - Research Centers and Universities
- Mapping
  - ESRI Tapestry
  - Social Explorer
- International
  - Bureau of Labor Statistics
  - GapMinder

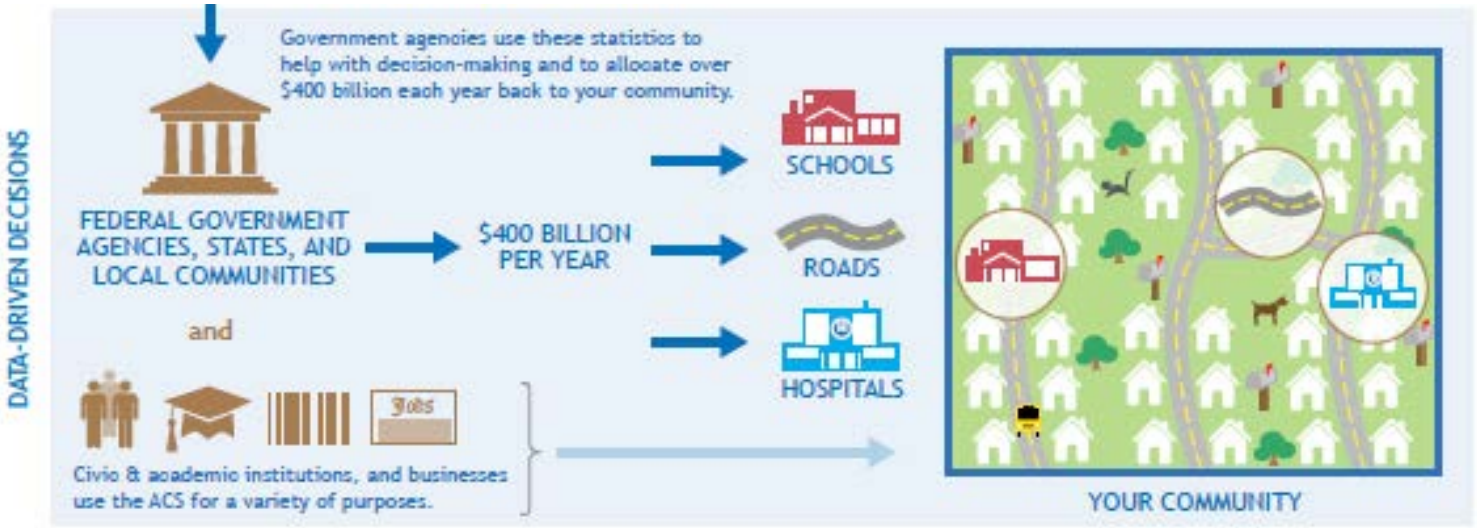
American Community Survey

- A large continuous survey
  - Population and housing characteristics
  - Small areas and small populations
  - Sample: 3.54 million resident addresses per year (290,000 per month)
- Content
  - Population
    - Social
    - Economic
    - Demographic
  - Housing

ACS data collection



ACS data collection



ACS sources:

- Easy Stats
- My congressional district
- QuickFacts

SSDAN: Social Science Data Analysis Network

- DataCounts! & WebChip
  - www.ssdan.net/datacounts/
  - Data
  - Datasets
    - Subject
    - Geography
  - Open with WebChip3.0
    - Command
      - Single variable -> Single Var -> Pie Chart
      - Marginals
      - Crosstabs -> Select variables -> Table -> Percent Across

Maria's module and activities

- 1: Quantitative Reasoning for the SS Classroom
- 2: Learning about US data
  - History of data production in the US
  - Agencies, topics and major surveys
  - Stats in Action Videos and other links
- 3: Univariate analysis and interpretation using Pivot tables (Excel) – SOCL 201
- 4: Bivariate analysis and interpretation using Pivot tables (Excel)
- 5: Multivariate analysis and interpretation using Pivot tables (Excel)
- 6: Interpreting and critiquing estimations

Assessment

- Comments from peers
- Previous to the activity
  - 5 T/F questions on a table
- During the activity
  - Grades for class assignment
- Weeks after the activity
  - 5 T/F similar questions on a table