Getting Comfortable with Uncertainty: Maths Teachers and Statistics

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ABS Mission

- To assist and encourage informed decision making, research and discussion within governments and the community by leading a high quality, objective and responsive national statistical service.

Statistical Literacy

- The ABS sees improving statistical literacy as an important objective;
  - Education Services
  - Statistical Literacy Unit
  - Training unit
- Many NSOs are doing similar
  - The latest IAOS journal devoted to statistical literacy
- OECD

What is Statistical Literacy?

from Gal,2007

- Understanding not computation;
- Knowing why and how data are produced
- Familiarity with basic terms and ideas of
  - descriptive statistics (eg mean, mode,)
  - graphical and tabular displays
  - variability critical
- Understanding basic ideas of probability
- Knowing how statistical conclusions are drawn

Why is it important

- 'data drenched' society
- essential for active citizenship
- the big questions of our time require statistical understanding
- essential skill for so many other disciplines
- Italian scientists currently facing criminal charges from Abruzzo earthquake;

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Joint ICMI/IASE Study 2008

- Common interest looking at education of statistics in schools;
- Issues and questions:
  - Maths and stats are not the same
  - What are the fundamental ideas?
  - Where does probability fit?
  - Technology
  - Importance of project work

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Statistics is never having to say you're certain

- Defensible but ultimately uncertain conclusions
- Different thought processes
- Implications for teaching

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Statistics is inductive

- Statistical reasoning is different from mathematical reasoning
- Not linear and deterministic but reiterative and interpretive
- Inferences from observed results

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- Context matters
- Measurement matters
- Process matters

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Judgement calls

- Data is dirty
- What is an outlier and what is an error
- When is it appropriate to 'zoom in'
- What statistical assumptions can be made

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Communication crucial

- 'That's not maths. Maths is sums.'
- A level of conceptualisation usually associated with the humanities
- All the W's

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Different for students

- students have trouble dealing with uncertainty
- students have trouble reasoning with uncertainty
- stronger maths students may be frustrated

Why should teachers care

- Develop healthy scepticism without cynicism or niaivity

Why should teachers care

- Different pedagogy needed
  - Real data, meaningful contexts
  - Use of technology
  - Different kinds of concepts
  - Communication skills
  - Group work

Statistical pedagogy

- Reasoning not recipes
- Concepts not algorithms
- Teachers have many of the same difficulties with statistics as do students (Doerr and Jacob, 2009)

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Teaching statistics

- the non trivial nature of learning to teach statistical inquiry
- Even teachers with high levels of PCK found it difficult to teach statistical concepts (Watson, Callingham & Donne, 2008)
- Statistics is a new discipline

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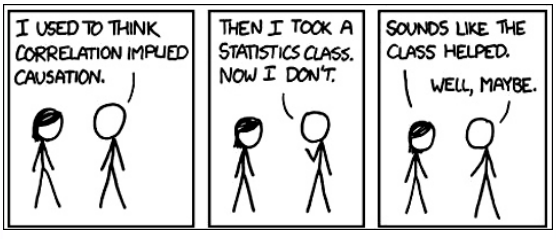
Technology is our friend

- real data;
- 'dirty data';
- mulitvariate data;
- geospatial data;



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