Statistical Literacy: Tools of Engagement

What competencies do statistically literate people have?

- Basic ideas, terms and language of stats

- Statistical methods

- Explain, decide, judge, evaluate and make decisions about information

Misconceptions

- Calculations = understanding
- Formulas help understand the idea

$$s = \sqrt{\frac{\Sigma(y-\overline{y})^2}{n-1}}$$

I see it!

$$s = \sqrt{\frac{1}{n-1}\left[\sum_i y_i^2 - \frac{\left(\sum_i y_i\right)^2}{n}\right]}$$

What?

- Use of statistical language demonstrates understanding:

   "Type II error occurs when we fail to reject H_o given H_o was false."

   Entschuldigen Sie, bitte?

Statistical literacy in *class*:

- Use relevant language & connect ideas with common threads. *(visualise, describe, measure, infer)*

- Cross reference and compare ideas

- Build ideas with a problem...formulas come last!

- Keep off the side trails *(n choose k)*

- If you are not going to use an idea later, why spend a lot of time on it now? *Know where the material is going!*

- Use concept mapping...build it as you go!

GAISE guidelines

"We present six recommendations for the teaching of introductory statistics that build on the previous recommendations from Cobb's report. Our six recommendations are:

1.Emphasize statistical literacy and develop statistical thinking;

2.Use real data;

3.Stress conceptual understanding rather than mere knowledge of procedures;

4.Foster active learning in the classroom;

5.Use technology for developing conceptual understanding and analyzing data;

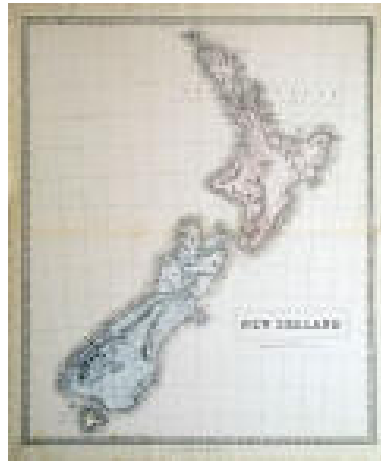*6.Use assessments to improve and evaluate student learning"*

Making it real...and making it stick!

- Analogies and Heuristics
- Real data, social justice issues, applets
- Classroom activities (including videos)
- Engaging and historically accurate examples.

One at a time...

Analogies and Heuristics

"Now go explain this to someone on Yonge street. "

Real data and social issues

- Chance Newsletter
- Numbers Guy, *Wall Street Journal*
- Election statistics: Canada, World
- Applets
- Articles that solve a problem with basic statistics (rugby and confidence intervals)

Classroom activities

- Bead bowl *(sampling, sampling distributions, Binomial)*
- M&Ms *(sampling, frequency distributions, probability distributions)*
- *Activity Based Statistics* worksheets *(matching games)*
- Student data

  eye colour – (types of variables, graphing, frequency tables, probability models, hypothesis tests on *p*)

  no. of pairs of shoes - (types of variables, skewed distributions)

  height - (measurement, types of variables, graphing, probability models, Normal distribution, sampling distributions, confidence intervals)

- Videos *(real situations, real data, real applications, real decisions)*
- STAPLE - Statistics Terms Associated with Popular Lyrical Expression

A bit of history

- Guiness beer and the t-distribution
- Galton (cousin of Darwin) and heredity for correlation and regression
- Tukey and the boxplot (1977)
- De Moivre and the Normal distribution…and probability theory and his own death.
- Florence Nightingale