

# Consulting on an Island: A Novel Approach to Teaching Statistical Collaboration Skills



Joint Statistical Meetings, Seattle  
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# ASA Curriculum Guidelines for Undergraduate Programs in Statistical Science (2014)

- **“Real applications.** ...Programs should ...provide experiences in designing studies and analyzing non-textbook data.”
- **“Ability to communicate.** Students need to be able to communicate complex statistical methods in basic terms to managers and other audiences ... Programs should provide multiple opportunities to practice and refine these statistical practice skills.”
- How?

[www.amstat.org/education/curriculumguidelines.cfm](http://www.amstat.org/education/curriculumguidelines.cfm)



# Collaborative Approach



## Biostatistical Literacy Course in Public Health

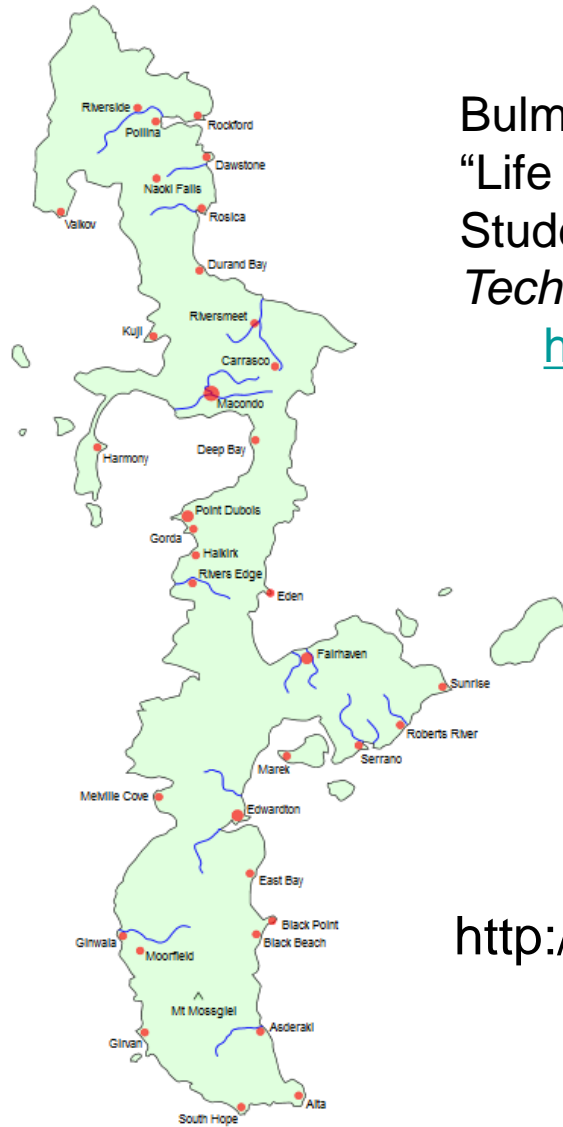
- Online graduate course
- Medical/public health professionals
- Emphasize statistical concepts
- No calculations

## Island Project

- Google Hangouts

## Consulting/Communication Course in Statistics

- Traditional classroom
- Seniors in statistics, mainly international
- Analytically proficient
- Emphasize consulting, writing & verbal skills



Bulmer, Michael and Haladyn, J. Kimberly (2011).  
“Life on an Island: a Simulated Population to Support  
Student Projects in Statistics.”  
*Technology Innovations in Statistics Education (TISE)* 5(1).  
<http://escholarship.org/uc/item/2q0740hv>

<http://island.maths.uq.edu.au>



# Alondra Gonzalez

HOME CONTACTS BIO SURVEY LOGOUT

## Recent Tasks

### Survey

### Blood Tests

Blood Adrenaline  
Blood APTT  
Blood Cholesterol  
Blood Endorphin  
Blood Estrogen  
Blood Ghrelin  
Blood Glucose  
Blood Hematocrit  
Blood Melatonin  
Blood Oxytocin  
Blood Potassium  
Blood Serotonin  
Blood Sodium  
Blood Testosterone  
Blood Type  
Blood Vitamin D  
Breathalyzer  
CDZ Lymphocyte Count  
Gene Array (Chromosome 1)  
Gene Array (Chromosome 2)  
Gene Array (Combined)  
White Blood Cell Count

### Urine Tests

### Physiology

### Alcoholic Drinks

### Nonalcoholic Drinks

### Food

### Injections

### Tablets

### Other Drugs

### Mental Tasks

### Coordination

### Exercise

### Music

### Environment

### Interventions

### Miscellaneous

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## Recent Tasks

### Survey

### Blood Tests

### Urine Tests

### Physiology

### Alcoholic Drinks

### Nonalcoholic Drinks

### Food

### Injections

Adrenaline 10 µg  
Erythropoietin 1000IU  
Glucose 10%  
Glucose 5%  
Hypertonic Saline Injection  
Hypotonic Saline Injection  
Influenza W42 50 µg  
Methamphetamine 50 mg  
Morphine Injection 20 mg  
Natural Insulin 1 unit  
Saline Injection  
Serotonin 10 µg  
Somatropin 1000 µg  
Synthetic Insulin 1 unit

### Tablets

### Other Drugs

### Mental Tasks

### Coordination

### Exercise

### Music

### Environment

### Interventions

### Miscellaneous

# Alondra Gonzalez

HOME CONTACTS BIO SURVEY LOGOUT

Alondra is 43 years old and lives in **Macondo**.

- Alondra is currently having her blood alcohol concentration measured...

- [View task history](#)
- [Add Alondra to my contacts](#)
- [Edit her biography](#)

## November 1971

Born in Macondo



Camila Gonzalez  
Mother



Fabian Gonzalez  
Father

## October 1987



Dating Riku Carrasco

## August 1988

Single





## Client/Investigators

## Consultants



# Island Studies Examples

- Effects of Methamphetamine on Cognitive Function in Young Adults
- **RE-WINE**: The Effect of Red Wine on Serotonin Release 
- The Effect of Cannabis Tea on Short Term Memory Scores
- Effect of diabetes on the blood glucose level of “The Island” population after exercise
- **YIKES!** Youth Islander Knowledge Enhancement Study [Effect of Dextroamphetamine on Arithmetic Performance] 
- Effects of Smoking on Pulmonary Functioning and Exercise Tolerance
- Effects of Music on Blood Pressure
- The **DREAM** Study: The Effect of Different Exercise Assignments on Melatonin



# Evaluation and Improvement

- Instructors need to moderate the client/consultant meetings
  - Draw out both consultants and clients to talk when needed
  - Prompt both sides to be clearer when necessary
  - Correct bloopers
- Altered group sizes to have few enough groups to be able to monitor them effectively
- Reduced number of required meetings
- Developed clearer instructions: e.g. flowchart, meeting checklists
- Found that many of the consultants needed to review basic statistics, sample size estimation. Added review material.
- Added role playing exercises to prepare for the client meetings



# Benefits for Student/Clients

- Application – Students apply the concepts and methods they learn in class to a ‘real’ study
  - Study design, sampling methods
  - Collecting and organizing (and cleaning!) data
  - Analysis and interpretation
- Collaboration – Students learn the necessity of teamwork, across specialties, to carry out a research study. They learn what works well and what doesn’t for a cross-functional geographically dispersed team.

# Benefits for Student/Consultants

- Provides experience with real clients / real challenges
- Develops problem solving skills
- Provides speaking and writing experience
- Generates interest from potential employers:
  - “I had an interview at the Federal Reserve Board where I discussed my consulting experience. They seemed very impressed that I got such an experience.”
  - “I recently had an interview and they were interested in [my] interactions with the biostats students, the results that my group came up with and the Island program itself.”

# Benefits for Instructors

- Improves teaching
  - Brings out issues students are having difficulty with, e.g. random sampling vs. random assignment. Provides a built-in example to use in explanations.
- Provides reality check for the effectiveness of the undergraduate statistics program
- Makes instructor-student relationship more collegial
  - Instructors/TAs become statistical collaborators. (Instructor doesn't know 'the answer'!)
  - Vastly increases the amount of non-homework-, non-exam-related interaction with students.

# Conclusions

- Many positives
  - Plan to continue into 4<sup>th</sup> semester this fall
- Biggest challenge: scalability
  - TAs with consulting experience help!
  - Future: Add peer-review?

# Questions?

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