The 4 C’s: Communicate, Collaborate, Create, Critically Think with Data

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The Seeds (pt 1)

GAISE (Guidelines for Assessment and Instruction in Statistics Education) include these recommendations:

- Integrate real data with a context and purpose
- Foster active learning
- Use technology to explore concepts and analyze data
The Seeds (pt 2)

“Exams and grades are temporary, but education is permanent.”
“Think of yourself less as a teacher and more as a designer of meaningful experiences.” (Norman Eng, Cult of Pedagogy)

• What “permanent” things to I want my students to take with them?
• What does it mean to “design meaningful experiences”? How can I do this?
The 4 C’s

• Critical Thinking
• Communication
• Collaboration
• Creativity
Three Units, Three Projects

1. Descriptive statistics
   • Exploring Data Using Visualizations

2. Probability
   • The Interview

3. Inferential statistics
   • A Synthesis
Exploring Data Using Visualizations

The Data Cycle

- ask questions
- research topic
- consider data
- analyze data
- interpret data
Exploring Data Using Visualizations

1. Pick a data set.
2. Ask 2 questions that can be answered using the data set.
3. Create graphs answering each of your questions.
4. Use appropriate summary statistics to answer your questions.
5. What are some additional questions that could be explored using your data set?
Project 1: Incorporating 3 of The 4 C’s

• 7-slide deck
• Slides set to advance every 15 seconds (“PechaKucha” or “Ignite”)
• Class presentations

Critical thinking, communication, creativity
Project 1: Exploring Data Using Visualizations

a. Slide 1: YOUR NAME (1 pt)
b. Slide 2: The name of the data set you are using and why you chose it (3 pt)
c. Slide 3: Your first question and the graph that you created to explore the question. (5 pts)
d. Slide 4: Any summary statistics that can be used to answer your question. (2 pts)
e. Slide 5: Your second question and the graph that you created to explore the question. (5 pts)
f. Slide 6: Any summary statistics that can be used to answer your question. (2 pts)
g. Slide 7: Additional questions that could be explored using this data set. (2 pts)
Obesity Around The World

- It is an interesting topic
- It is a serious world wide problem.
- Not everybody knows well about it.
- We need to understand it better.
- Age standardized estimates for obesity prevalence, overweight prevalence and mean BMI (Body Mass Index) for males and females from various countries. Obesity is defined by a BMI > 30 kg/m².
Rock and Roll Hall of Fame

![Rock and Roll Hall of Fame logo](shutterstock)
Is there a positive relationship between the number of studio albums compared with top 40 hits?
Data Set “2014 MLB Top 100 Batters”

I picked MLB stats because I'm a Giants fan and softball player! I'm curious how many homeruns the top 100 players hit, and how often these players do well hitting (batting average).
Q2: Which League Had Better Averages?

Comparing Leagues - Which has better Averages?
League = American

Comparing Leagues - Which has better Averages?
League = National
Project 2: Incorporating 3 of the 4 C’s

Interview someone in a career you’re interested in.

• What are the main responsibilities of your job?
• What kind of educational preparation did you need for your job?
• How do you use math and/or statistics in your job? Explain.
• What kind of advice would you give someone who was interested in having a job like yours.
• Ask at least 2 additional questions of your choice.
Project 2: Incorporating 3 of the 4 C’s

Written summary in the form of a short newsletter article or blog post
OR
Create an infographic about the career

Critical thinking, communication, creativity
"I use math daily!"

Math in dietetics most often consists of calculating patients BMI, % of weight loss, along with calorie and macronutrient needs. Being able to interpret statistics of study results is useful in evaluating the different possible interventions to use with patients.
DO DOCTORS DO MATH?

- Statistics is used to determine the effectiveness of a treatment
- Statistics is conveyed to patients to help them decide the pros and cons of a treatment
- Statistics is used to show how effective a treatment would be based on users' experience
- Math is used to calculate the appropriate dosage of medicine
- Math is used to add up and calculate a patient's chance of heart attack

\[ P(\text{math}) = 100\% \]

WORDS OF WISDOM FROM A DOCTOR

WHAT IS THE MOST IMPORTANT QUALITY FOR A DOCTOR TO HAVE?

"Integrity. Integrity ensures truth and reality seeking. I believe if a doctor is truthful, he/she can experience how a sick patient is going through and can exhibit the personality trait of empathy. You must have heard this saying, 'patients do not care how much you know, but they know how much you care.' This rings true especially in the practice of medicine. Integrity also exudes trust which is very important in patient-doctor relationship."
HOW DO CONDUCTORS USE MATH AND STATISTICS?

“MUSIC IS MATH”
Counting and understanding divisions of time is essential to being a clear conductor.

Counting, rhythm, scales, intervals, patterns, harmonies, time signatures, overtones, tone, and pitch are all described by mathematics!

STUDENT DEMOGRAPHICS
Teaching conductors consult demographics and other statistics to better understand their students’ backgrounds.

AMERICAN CONDUCTORS
Graduate (Masters/PhD/DMA)
Education required
Number of jobs: 74,800
Top earners salaries (2014): 800K - 5M
Average age: 61 in 2010, 45 in 2016
Conductors/composers (median salary): $50K/Year
Postsecondary teachers (median salary): $75K/Year
Project 3: A Synthesis

• Pose a statistical question based on some parameter
• Gather data that will help answer the question (data plan)
• Use the data to answer your question (descriptive and inferential methods)
• Discuss study limitations
• What additional questions does the project raise?
Project 3: Incorporating 3 of the 4 C’s

Academic Poster presentations
Colleagues from throughout the campus are invited
Coffee and refreshments provided

Critical thinking, communication, creativity
Love at First Swipe

15% of American Adults Have Used Online Dating Sites or Mobile Dating Apps

Introduction

How do people fall in love? Historically, people met at work, went on dates, or were introduced by friends or family. Today, we have online dating sites and mobile apps.

According to a study done by the Pew Research Center in 2016, 15% of American adults have used online dating sites or mobile dating apps. It is estimated that 30% of college students, especially those of Valley College, are more likely to use online dating than the general population. To answer this question, I performed a test on Valley College students.

A hypothesis that came up was that college students who had used online dating sites or mobile dating apps were more likely to use them than those who had not. To test this hypothesis, I performed a t-test on the data collected from the survey.

Conclusion

Evidence gathered from my survey suggests that most popular online dating sites or mobile apps are not effective in finding a partner. Further research is needed to understand the effectiveness of online dating sites or mobile apps.

Do you believe in True Love?

Methodology

I surveyed 150 Valley College students to determine how they met their current partner. I asked them about their dating history, how they met their partner, and their thoughts on online dating. I also asked them to rate their satisfaction with their partner on a scale of 1 to 5.

The results showed that 60% of students met their partner through online dating sites or mobile apps. Further research is needed to understand the effectiveness of different online dating sites or mobile apps.
Don’t be a cook. Be a chef.