

Promoting Student Engagement in Introductory Statistics Using Socially Relevant and Real Data

Kathy Kubo, College of the Canyons



Today's agenda

- Preparation: Build your learning community
- Data visualizations: Activities & project
- More socially relevant & real data examples in our new online materials

Build your learning community



Set the tone from Day 1

- Set class norms
- Embrace group work
- Attend to the affective side of learning



Set class norms

1) What we don't like about group work

2) What can we do to address these problems

What we don't like about group work

- independent (non-collaborative) member
- not agreeing - external pressure (within group)
- not having enough autonomy to make decisions
- everyone getting the same grade
- finding the balance between being bossy and being helpful
- miscommunication
- no time outside of class to do work
- being an introvert
- not everyone is held accountable for tasks
- closed mindedness
- Contrasting personalities
- Some people are not reliable to do their own part
- when the presentation isn't divided equally
- different levels of motivation
- easy to get sidetracked
- bossy "super chickens"
- language barrier

What can we do to address these problems?

- politely call people out (good communication)
- ask everyone in group for input
- everyone participates
- gently remind people to contribute
- be open to feedback & keep an open mind
- meeting virtually
- have patience & have a good attitude
- try to make people comfortable
- don't be selfish / help each other
- be respectful
- listen to other people's opinions
- don't be a "super chicken"
- learn about everyone's strengths
- have respect for everyone's life outside of class
- be committed
- be prepared and ready to work in a group



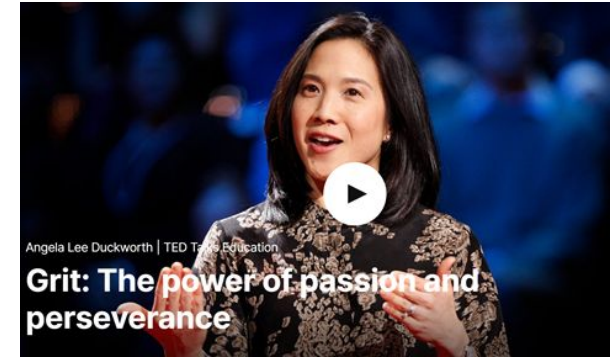
Embrace group work

- Start on Day 1
- Random assignment
- Accountability
- Be intentional about providing activities/assessments that benefit from group work

Attend to the affective side of learning

Videos, readings and reflections

- Fixed vs. growth mindset
- Making mistakes
- Grit
- Productive struggle
- Coping with stress



Which topics are you struggling with in Modules 8 & 9?

Chapter 9. cnderstanding of the regression line

These two modules have been the toughest overall

clear understanding of the regression line

Correlation coefficients

chapter 9 fitting the line

identifying outliers (x,y)

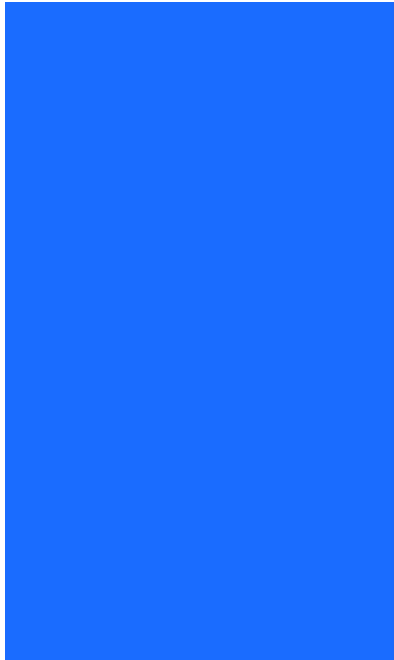
My brain isnt smart enough

correlation is not causation, how would i write a sentence explaining the explanatory variable and response variable since x is not a cause of v?

ALL of it (but its my fault i have not started the modules yet lol)

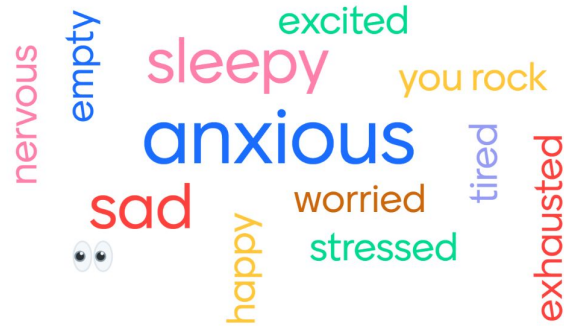
8 how do we know if something is strong or weak

YOU ARE SMART!!



Share one word to describe how you feel

Mentimeter




16

From Week 6 - Fall 2021

**Be patient
kind
understanding**





Create a welcoming and engaging learning environment

- Inclusive for different points of view and skill levels
- Encourage students to support each other
- Ask students how you can best support their learning AND listen carefully
- We are supporting students, not lowering standards



How will you handle challenges?

- Group work
- Sensitive topics (for example: medical issues, eating disorders, gun violence, suicide, sexual assault)
- Misinformation and false data

**Encourage students to talk
about data**

Early and often



Data visualization project

- Build statistical literacy and an inquiry mindset
- Create opportunity for relevant, real-world connections with course content
- Student-driven
- Practice presentation skills
- Strengthen community through sharing interests/passions



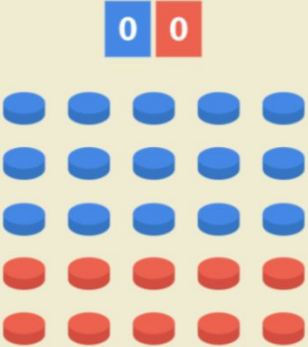
Establish a daily routine

Based on New York Times - “What’s Going On in This Graph?”

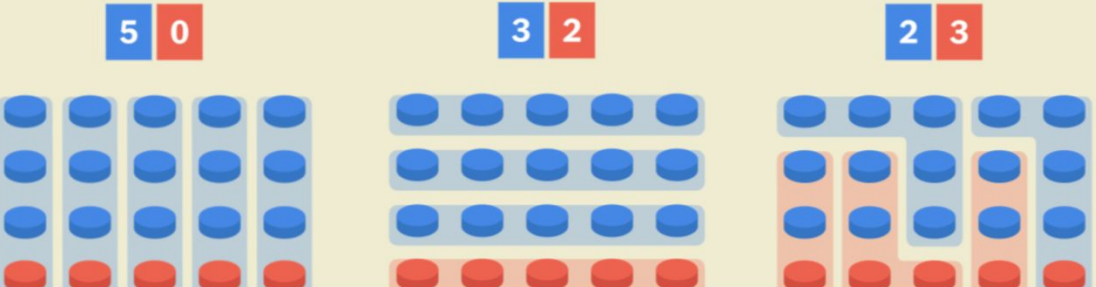
- What do you notice?
- What do you wonder?
- What’s going on in this graph? Write a catchy headline that captures the graph’s main idea.

What's Going On in This Graph?

Graphs, maps and charts from The Times -- and an invitation to students to discuss them live.



How could five voting districts with five voters each be drawn?
Here are some examples.



Introduction to 'What's Going On in This Graph?'



Want to learn more about this feature? Watch this short introduction video and start using New York Times graphs in your classroom.

August 2, 2021 · By THE LEARNING NETWORK

Teach About Inequality With These 28 New York Times Graphs



Graphs about income, education, health care and the pandemic can help students think critically about stubborn and growing inequalities in American society.

May 11, 2021 · By MICHAEL GONCHAR

Over 60 New York Times Graphs for Students to Analyze



A collection of graphs, maps and charts



Day 1 group presentations

- 9 to 10 infographics (1 per group) - provided by instructor
- Groups of 3 to 4
- Preparation time: 10-15 minutes
 - What do you notice?
 - What do you wonder?
 - What's going on in this graph? Write a catchy headline that captures the graph's main idea.



From Day 2: Warm-up discussion

- 1 infographic (instructor-selected)
 - What do you notice?
 - What do you wonder?



Data visualization project (Week 2)

- Select and present to the class an interesting infographic

An infographic is a visual image such as a chart or diagram used to represent information or data.

- In your presentation, one goal is to help your audience understand the story behind the data. Thus, it's better to choose an infographic that is embedded in an article with a narrative about the data and its source.
- It's best if you choose a topic that you are very interested in or passionate about. It shows during your presentation!



Data visualization project

- Instructor pre-approval 48 hours before presentation
- Target time: 4-5 minutes, followed by post-presentation Q&A with classmates
- May pre-record (Zoom works well)
- Post-presentation reflection assignment



Presentation schedule

Date	Presenter 1	Presenter 2	Presenter 3	Presenter 4	Presenter 5
M 09/07	Labor	Day	Holiday		
W 09/09					
M 09/14	Alycia (COVID-19) +	Claire (serial killers) +	Samantha (retail bankruptcy) +		
W 09/16	Haley (CA wildfires)+	Cherry (STD statistics)+	Corinna (racial/ethnic disparities heart disease)+		
M 09/21	Lily (wildfires & climate change)+	Devyn (voter turnout)+			
W 09/23	Brian (substance abuse)+	Mitchell (Word Mapper)+	Bryce (video games)+		
M 09/28	Scarlette (US military spending)+	April (Trump claims-interactive)+	Alex (Athletes taking a knee)+		
W 09/30					
M 10/05	Sams (Obesity)+	Sal (DACA)+	Ryan (Colorectal cancer)+		
W 10/07	Jocelyn (History of Pandemics)+	Mia (military demographics)+	Michael (Sleep)+	Jabree (sneakers data) +	
M 10/12	Julio G (teens & depression)- Zoom recording Suzy (gadget addiction)+	Kayla (mapping police violence)+	Cami S (political party affiliation)+	Gisselle (social media) +	

Keep searching

- Graphics are decorative
- Data is presented in words rather than through graphical displays of information

Teens and Tots: It's Better to Wait

Why teen pregnancy prevention matters



Children of teen mothers are more likely to be born prematurely and at low birthweight.



Nearly all teens and adults say that reducing teen pregnancy is a very effective way to reduce the high school dropout rate and improve academic achievement.



Less than half of mothers who have a child before they turn 18 ever graduate from high school.



Less than 2 percent of mothers who have children before 18 have a college degree by age 30.



Teen pregnancy is closely linked to critical social issues such as poverty, educational attainment, involvement in criminal justice and child welfare systems, and more.

What is CSC doing to reduce teen pregnancy?

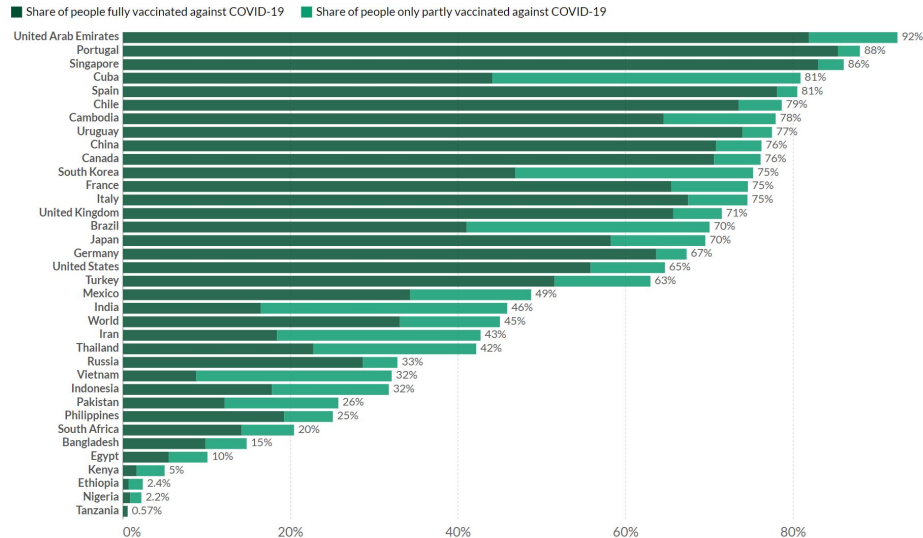


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Share of people vaccinated against COVID-19, Sep 27, 2021

Alternative definitions of a full vaccination, e.g. having been infected with SARS-CoV-2 and having 1 dose of a 2-dose protocol, are ignored to maximize comparability between countries.

Our World in Data



Source: Official data collated by Our World in Data. This data is only available for countries which report the breakdown of doses administered by first and second doses in absolute numbers.

CC BY

In September 2020, 44% of Americans had heard at least a fair amount about the phrase 'cancel culture'

% of U.S. adults who say they have heard ___ about the phrase "cancel culture"

	NET	None at all	Not too much	A fair amount	A great deal	NET
U.S. adults	56	38	18	22	22	44
Men	48	31	17	25	27	52
Women	63	44	19	19	18	37
Ages 18-29	36	21	15	20	43	64
30-49	54	36	18	24	22	46
50-64	64	46	18	20	15	36
65+	67	46	21	21	12	33
HS or less	68	49	19	16	16	31
Some college	53	36	17	21	25	46
College+	44	26	18	29	27	56
Rep/Lean Rep	56	40	16	20	23	44
Conservative	50	35	16	24	26	49
Mod/Liberal	64	48	16	16	20	36
Dem/Lean Dem	54	35	19	24	22	46
Conserv/Mod	66	45	21	19	15	34
Liberal	41	23	17	29	30	59

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EXHIBIT 2.5: Estimates of Homeless Individuals
By State, 2020

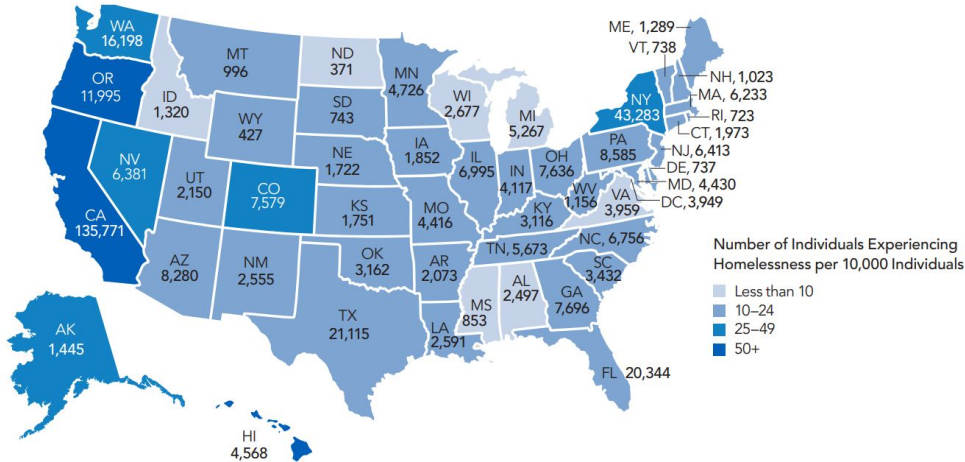
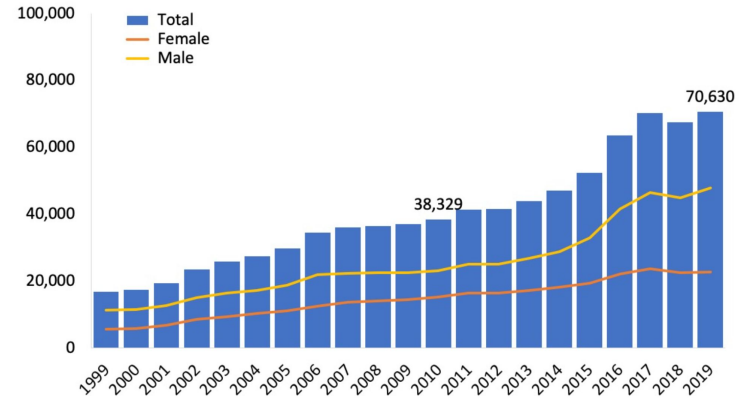
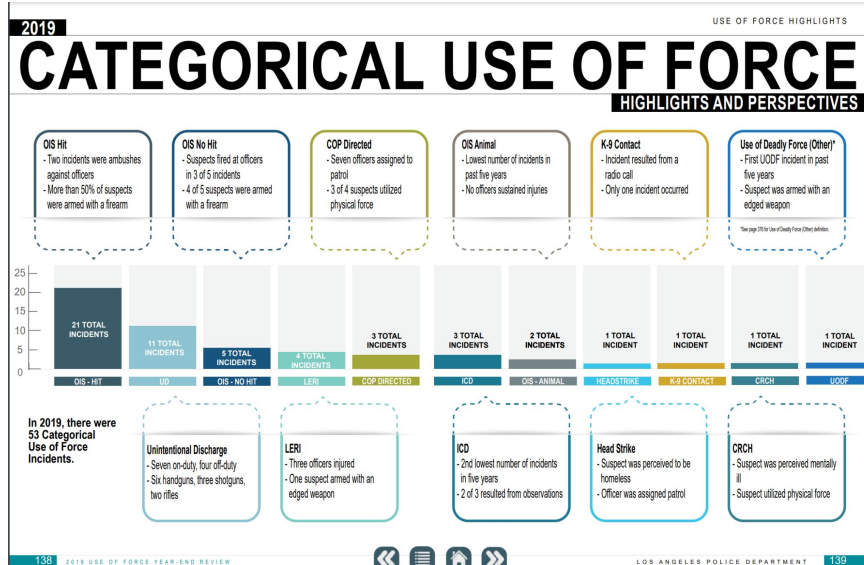


Figure 1. National Drug-Involved Overdose Deaths*
Number Among All Ages, by Gender, 1999-2019

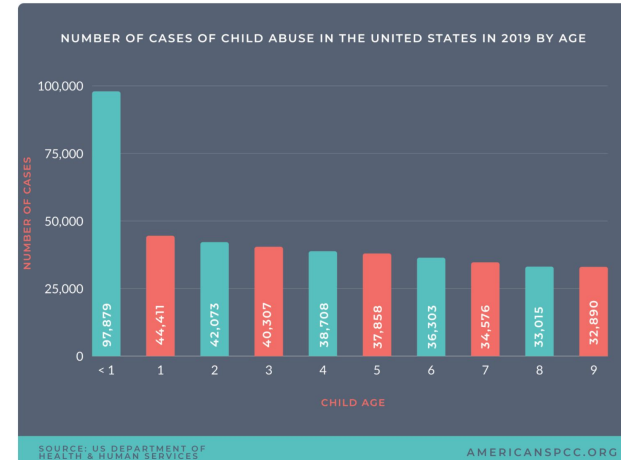
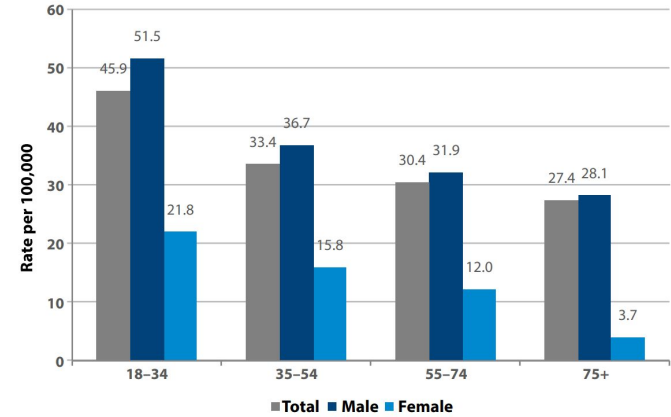


*Includes deaths with underlying causes of unintentional drug poisoning (X40-X44), suicide drug poisoning (X60-X64), homicide drug poisoning (X85), or drug poisoning of undetermined intent (Y10-Y14), as coded in the International Classification of Diseases, 10th Revision. Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2019 on CDC WONDER Online Database, released 12/2020.

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Graph 6. Veteran Suicide Rate by Age Group and Sex, 2018





Grading rubrics

Post-presentation reflection

- Included in the project instructions

**Our new online
professional development content
(Canvas)**



Our facilitator team

Dr. Roxy Peck, Cal Poly, San Luis Obispo

Scott Fallstrom, MiraCosta College

Kathy Kubo, College of the Canyons

With generous support from

The California Community Colleges Chancellor's Office



Our instructional framework

Guidelines for Assessment and Instruction in Statistics Education College Report (2016)

GAISE Recommendations

1. Teach statistical thinking
 - a. Teach statistics as an investigative process of problem-solving and decision making
 - b. Give students experience with multivariable thinking
2. Focus on conceptual understanding
3. Integrate real data with a context and purpose
4. Foster active learning
5. Use technology to explore concepts and analyze data
6. Use assessments to improve and evaluate student learning


Recommendation 3:

*Integrate real data with a context
and a purpose*



Canvas structure

☰ ▶ Introductory Module

Complete All Items  + ⋮

☰ ▶ Module 1 - Estimated time: 60 minutes

Prerequisites: Introductory Module

Complete All Items  + ⋮


☰ ▶ Module 2 - Estimated time: 60 minutes

Prerequisites: Introductory Module

Complete All Items  + ⋮


☰ ▶ Module 3 - Estimated time: 60 minutes

Prerequisites: Introductory Module

Complete All Items  + ⋮

☰ ▶ Module 4 - Estimated time: 60 minutes

Prerequisites: Introductory Module

Complete All Items  + ⋮



Topics

“What’s in your water?”

Hypothesis testing with water quality in Michigan

“Modeling fire spread”

Linear regression with California wildfire prediction

“Telling a story with infographics”

Visualizing data

“What are the chances?”

Probability with context and limited formulas

Flint (and now) Benton Harbor water crisis

Scott Fallstrom
MiraCosta College





Modeling fire spread

Dr. Roxy Peck
Cal Poly, San Luis Obispo

Modeling Fire Spread

An Activity by Roxy Peck

Wildfires are unplanned fires that burn in natural areas like forests, grasslands, or prairies. They often spread quickly and can move into residential areas. Wildfires can be devastating to both natural areas and communities, creating major ecological and economic damage.

A wildfire risk analysis ¹conducted in 2021 found that in California alone, more than 2 million properties were at high to extreme wildfire risk.

Scientists use mathematical models to try to predict where wildfires might start and how they spread.



Photo by [Benjamin Lizardo](#) on [Unsplash](#)

Telling a story with infographics

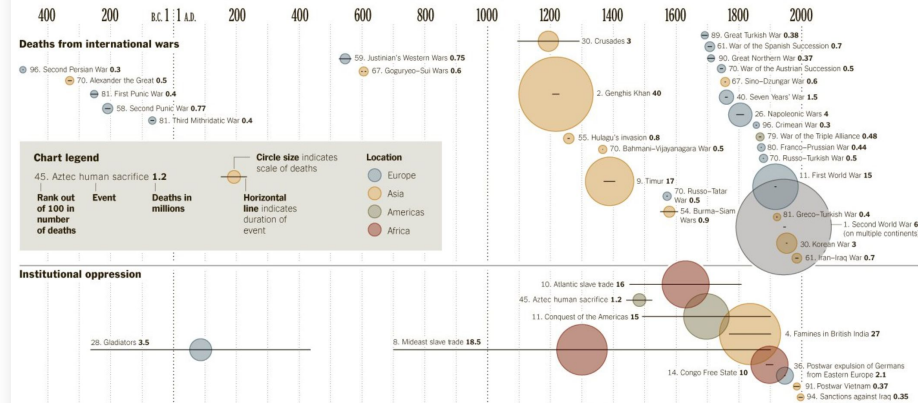
Kathy Kubo
College of the Canyons

Population Control, Marauder Style

Last week, the United Nations announced that the world's population had reached seven billion, but there have been times when it headed in the opposite direction, and not in pleasant ways. The savagery of the Mongol conqueror Genghis Khan may have culled the global population by about 11 percent; two bloody upheavals in China — the An Lushan Rebellion and the collapse of the Xin Dynasty — each may have felled about 6 percent of humanity. Those are but 3 of the 100 worst atrocities in history, as cataloged by Matthew White in "The Great Big Book

of Horrible Things," an amusing (really) account of the murderous ways of despots, slave traders, blundering royals, gladiators and assorted hordes. Estimating the tolls from such horrors is an inexact science, given war's nature and the mysteries of antiquity. The deadliest "multicides" are more plentiful in recent centuries, given that there were more people to kill and better ways to kill them on a grand scale. Even so, killings as a percentage of all humanity are probably declining. Below, the sweep of human brutality in a timeline.

BILL MARSH








What are the chances?

Dr. Roxy Peck
Scott Fallstrom

*Alternatives to the
traditional approach
to teaching probability*



What's in each module?

☰ ▾	Module 4 - Estimated time: 60 minutes	Prerequisites: Introductory Module	Complete All Items	✓	+	⋮
☰	 Module 4 - Background and Objectives View			✓		⋮
☰	Activity and Reflections			✓		⋮
☰	 Module 4 - Main activity and Embedded Video			✓		⋮
☰	Review and Resources			✓		⋮
☰	 Module 4 - Resources			✓		⋮



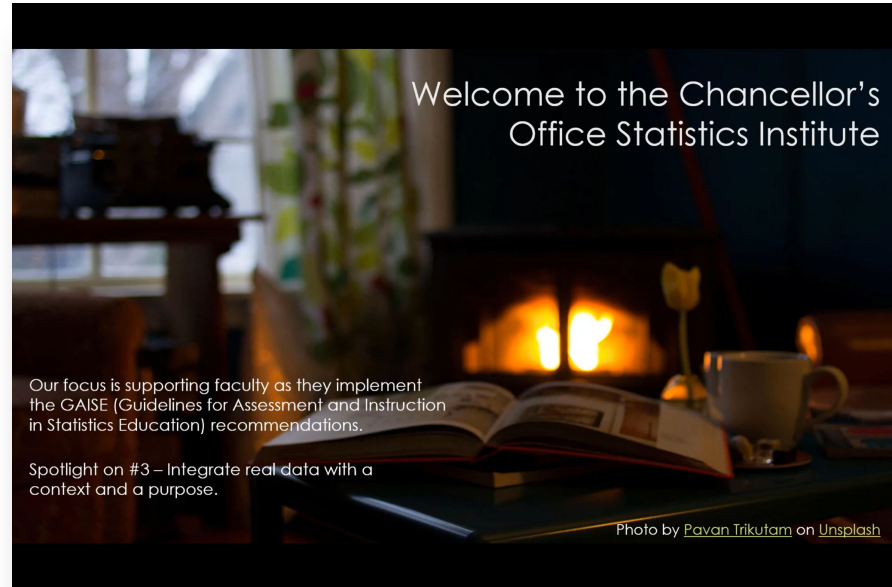
Highlights

- 4 modules (approximately 1 hour each)
- Video walkthrough
- Class activities
- Teaching tips/troubleshooting issues
- Additional resources
- Badges awarded after module completion (total of 4)



Available in early 2022

Tentative launch: February 2022



Join us online 01/29/22

Winter 2022

Chancellor's Office

Statistics Institute workshop

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Any questions?



Thank you!

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