MAA | MATHEMATICAL ASSOCIATION OF AMERICA | PROGRAMS **StatPREP**
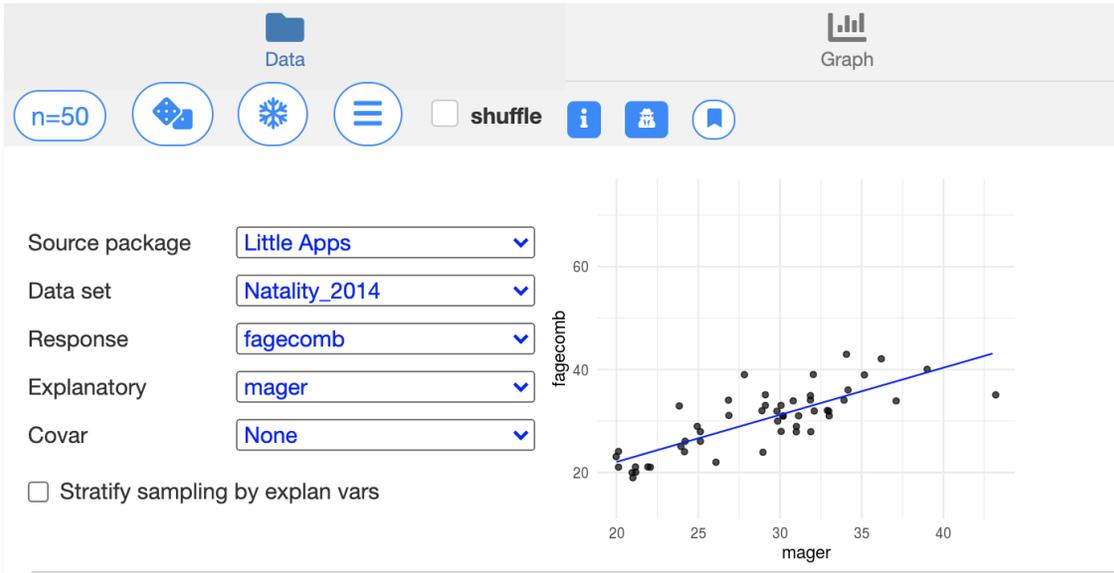
NEWSLETTER

"HOW MUCH IS EXPLAINED?" ACTIVITY FOR LITTLE APPS

BY KATHRYN KOZAK

"How Much is Explained" is an activity to help students understand the concept of how much of the variation in a response variable is explained by the explanatory variable(s). The activity can be found at https://statprep.github.io/LittleAppSite/Activities.html or by clicking on Resources then Little Apps and Activities for Little Apps from http://statprep.org/. This activity has the students pick different response variables and one or more explanatory variables and visually find the value of R^2.

This activity provides a visual understanding of these concepts by using the regression Little App (https://maa-statprep.shinyapps.io/Little_App_Regression/).

The activity explains to the students the concepts through an orientation. Then the activity has them pick a particular response variable,

NSF   AMATYC   ASA

WHO'S WHO:

LEADERSHIP TEAM

Mike Brilleslyper,
Air Force Academy

Jenna Carpenter,
Campbell University

Danny Kaplan,
Macalester College

Kathryn Kozak
Coconino Community College

Donna LaLonde,
ASA

Ambika Silva
College of the Canyons

Deirdre Longacher Smeltzer
MAA

HUB LEADERS

Joe Roith, St. Olaf's College, Northfield, MN (2017-18)

Ambika Silva, College of the Canyons, Santa Clarita, CA (2017-18)

Helen Burn, Highline College, Seattle, WA (2018-19)

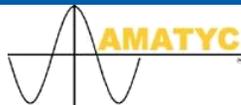**Hwayeon Ryu, Elon University, Elon, NC (2018-19)**

Carol Howald, Howard Community College, Columbia, MD (2019-2020)

Thomas Kinzeler, Tarrant County College, Fort Worth, TX (2019-2010)

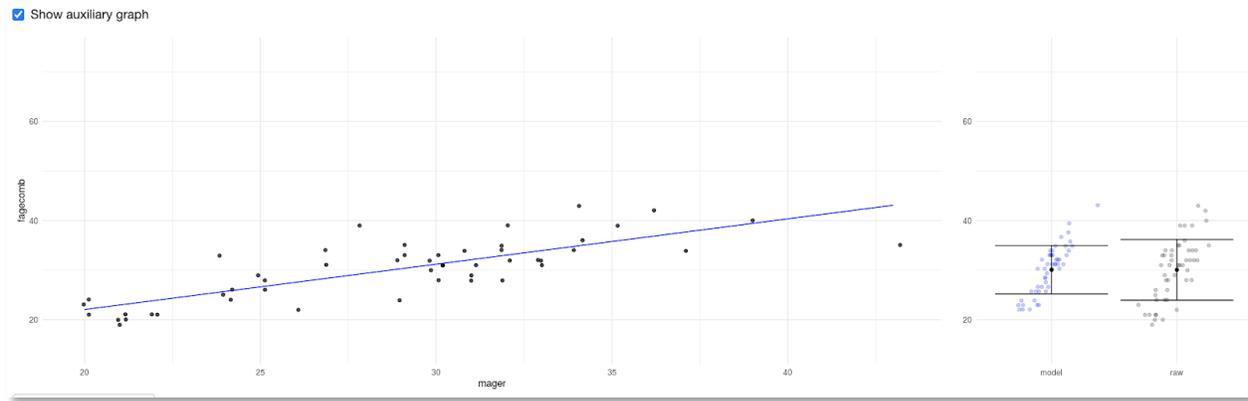**Rona Axelrod, Florida SW State College, Fort Myers, FL (2020-2021)**

Brooke Orosz, Essex County College, Newark, NJ (2020-2021)

(fagecomb - father's age) and explanatory variable (mager-mother's age) for the data set Natality. The students will then expand to the larger graph and turn on the auxiliary graph. Then the students are instructed on how to calculate the R value.

The students can then press the Stats icon on the right side of the Little App to find the calculated R^2 value. Make sure you tell your students to square the R value they found to check it with the calculated value.

Next the students can play with their own variables, including a covariate. This allows students to play around with different variables in the dataset. They can even change datasets to play around some more.

current

- n = 50
- dflex = 1
- var_raw = 37.54
- var_model = 23.82

thus ...

- R-sq = 0.634
- F = 83

In your classes, you could have the students work in groups to go through and answer all of the questions. If your class is in person, then there needs to be at least one computer, iPad, or smartphone for each group. If your class is virtual, then your students probably have a computer or device to use with this activity. In synchronous virtual classes, you could set up the groups using whatever system you are using, and then ask the students to discuss what they are doing in their groups and what conclusions they come up with.

This is just one of the many activities that you can use in your class. Please check out the rest of the activities at https://statprep.github.io/LittleAppSite/Activities.html. The August issue of the newsletter also gives a general description of all the activities available.

2020 ELECTRONIC UNDERGRADUATE STATISTICS RESEARCH CONFERENCE

BY DONNA LALONDE

"If you are not nervous, you don't care enough." That was advice that a former colleague shared with students who were about to present their research projects. It has stayed with me. The opportunity to share work of which you are proud is one of the best parts of being a researcher. Participating in conferences help students realize their work is important and that they are part of a community.

The Electronic Undergraduate Statistics Research Conference (eUSR) provides a great venue for students to be a part of a research community and to have the experience of presenting their work. Even if your students are not ready to make a presentation, by listening to the presentations of their peers they will see what's possible. eUSR 2020 will take place on Friday, November 6, 2020, beginning at 11:30 a.m. ET. The conference is free but registration is required.

In addition to video presentations by student researchers, Gabriela de Quieroz, Senior Engineering & Data Science Manager at IBM will give a keynote talk - "Data Science as a Team Sport." The afternoon will include a panel on career opportunities in industry and government.

The conference website invites participants to "watch," "learn," and be "inspired." Don't miss this opportunity - https://www.causeweb.org/usproc/eusrc/2020!

Stay Tuned!

More information on Workshops and Activities for 2021 coming soon!
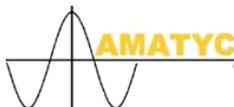
BUILDING COMMUNITY THROUGH DISCUSSION BOARDS: COLGATE VS. THE ASA (ADVERTISING STANDARDS AUTHORITY)

BY AMBIKA SILVA

Below is a billboard for Colgate. The headline for a poster campaign advertising Colgate toothpaste declared "More than 80% Of Dentists recommend Colgate" and "Colgate, used and recommended by most dentists". The topic for this week is about context in surveying. Apologies for the low quality picture, there are not many pictures available as this advertisement was banned!

Sample Prompt and Student Responses

Respond and answer the following questions using complete sentences. Then respond to at least two of your classmates!

1. What does that imply for you? What would you think if you saw that on a billboard? (Assuming that they are not lying)
2. It appears that when commissioning research into the use of their product, Colgate instructed a research agency to survey dentists and hygienists on a wide range of subjects each year and all dentists and hygienists took part in the survey voluntarily. Does this change your mind from what you thought in #1?
3. It turns out that when dentists were surveyed, they could choose several brands – **not just one**. This caused the ASA, Advertising Standards Authority, to ban this ad. In light of this information, why did the ASA say this was misleading? What implications may this have on the data they collect, or the statistic they portrayed?

4

BUILDING COMMUNITY Continued...

Student sample responses can vary wildly, and a few are given here to demonstrate the type of first responses students may give:

Student #1 initial post (unedited):

1: To me this billboard implies that Colgate is the top recommended toothpaste by dental professionals. I would probably assume that because so many dentists recommend this toothpaste, that it is most likely the best brand to buy.

2: Because the billboard only references dentists and the study surveyed both dentists and hygienists, they definitely seem to be reporting false information. The fact that it is also a voluntary survey could also skew the results in favor of the ad campaign.

3: Being able to choose multiple brands in the survey is misleading because Colgate may not have been the top pick at all. Honestly, how many toothpaste brands are there? If allowed to pick multiple answers, you could name the majority of toothpaste brands. Just because Colgate was mentioned does not mean it is the top choice of dental professionals or that they strongly recommend the product.

Student #2 sample response (unedited):

Assuming they are not lying, this implies to me that Colgate is trusted by the majority of dentist out there. 80% is stating that almost all dentist recommends this product since the minority that do not recommend is 20%.

Yes, it does change my mind about on what I thought from #1 simply because it's not just dentist as they also mentioned hygienists. Stating just Dentist is beneficial to them as they are the actual doctors. People trust more on what a doctor would recommend rather than a hygienist.

This means that the information on the billboard is completely misleading because they are not providing 100% of the details from the survey that these dentist and hygienist took. What if some of them like other toothpaste just as equally and that other toothpaste is actually cheaper in stores to purchase? More than likely a consumer would pick the cheaper brand if they knew it was just as effective.

Within the discussions, students will respond to each other:

What do I want them to discuss or understand afterwards?

Is Colgate being truthful or lying? They are telling the truth, but being misleading. 80% of dental practitioners did recommend Colgate. But at the same time, they recommended other brands. Their poster implied that 80% prefer Colgate exclusively, which is not accurate. They attempted to say in court that they were factually correct and never intended to imply that dentists were recommending Colgate over other brands. For more information, please see https://marketinglaw.osborneclarke.com/retailing/colgates-80-of-dentists-recommend-claim-under-fire/. How impressive would a billboard with the slogan "80% of dentists think Colgate is OK" be?

Motivation to do Discussions

While this discussion can be put on an exam or other assessment, this is more about making students critically think and be aware of the statistics they may see in

everyday life. Misleading statistics may contribute to other decision-making biases and errors, and can impact our outlook on life. While decisions on toothpaste may seem trivial, it is vital for students to think critically about the information that can be presented to them as other decisions may be more impactful. This is also a good reminder for all advertisers that data should not be distorted to provide a more attractive headline.

Join the Discussion!

Do you have thoughts on using this as a discussion post? Join the conversation online at MAA Connect, https://connect.maa.org/home.
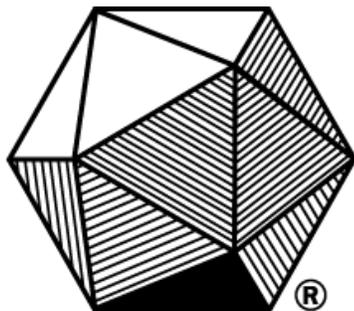
Need Help Joining?

Getting Started Guide

Getting Started Video

StatPREP October Webinar

UPCOMING EVENTS

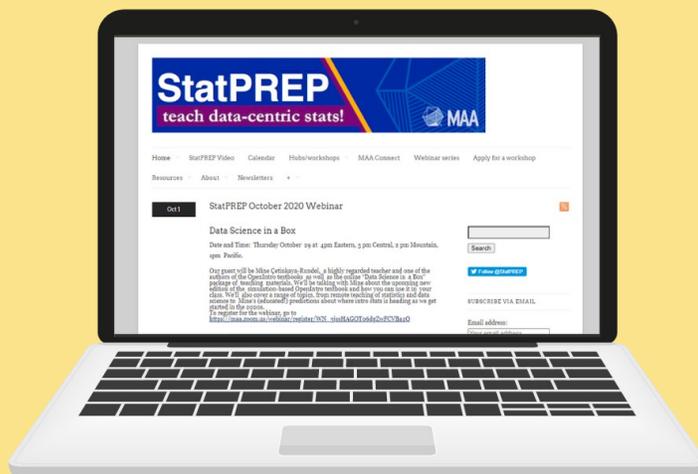## THURSDAY, OCTOBER 29

4 PM ET

Data Science in a Box

Host: Danny Kaplan

Our guest will be **Mine Çetinkaya-Rundel**, a highly regarded teacher and one of the authors of the OpenIntro textbooks as well as the online "Data Science in a Box" package of teaching materials. We'll be talking with Mine about the upcoming new edition of the simulation-based OpenIntro textbook and how you can use it in your class. We'll also cover a range of topics, from remote teaching of statistics and data science to Mine's (educated!) predictions about where intro stats is heading as we get started in the 2020s.

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