Communicating progress in a statistics course through non-traditional grading

As we are waiting to start:

Read through the prompt and corresponding student solutions shared at your table. Individually determine what scores (on a 0-10 scale) you would give to each student solution. Record these three numbers down for later.

USCOTS 2023 Workshop
Thursday, June 1st

Webpage:
https://aloy.github.io/uscots2023/

Who we are

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Special thanks to:

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What brings *you* here today?

Questions to discuss:

- What brings you here today?

- What current frustrations do you have with grading and assessment?

- What ideally would you like to achieve with grading in your courses?

Why *we* pursued non-traditional grading

- allow for more **flexibility**
- believed to be more **equitable** assessment techniques for students with diverse learning styles and background knowledge
- embrace **constructive failure** and promote a **growth mindset**
- help students feel comfortable and **confident** in their statistics abilities
- encourage **complete understanding** of topics

Assessing Student Work
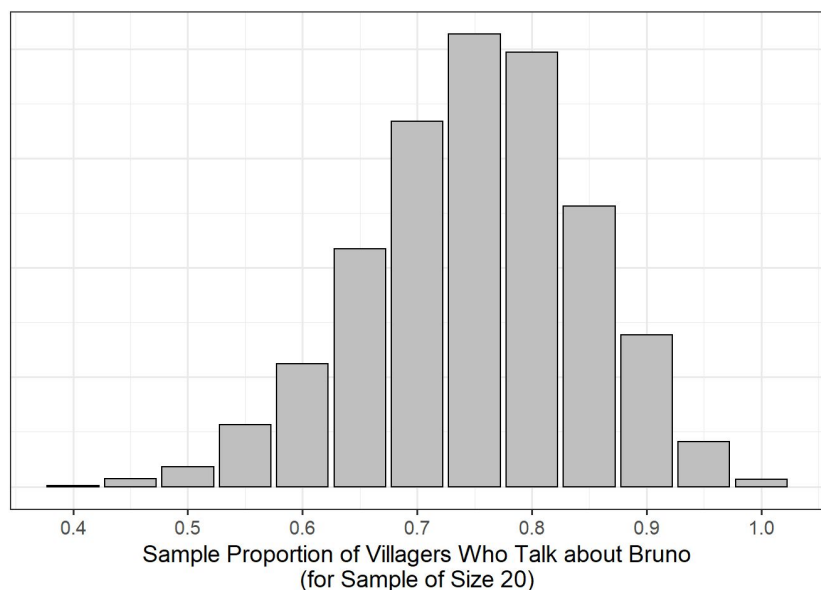
The Prompt

Mirabel needs to find her Tío Bruno. Despite claiming that they don't talk about Bruno, Mirabel has found that when given the opportunity, several people will share their feelings about her reclusive uncle.

Mirabel is interested in the proportion of villagers who will share their thoughts on Bruno. She discreetly asks a random sample of n = 20 villagers about Bruno, and she records whether the individual shares their thoughts on Bruno or simply refuses to speak about Bruno. She is interested in testing the following hypotheses

H_0: $\theta \leq 0.75$ vs. H_1: $\theta > 0.75$

where θ is the proportion of villagers who will share their thoughts on Bruno.

To the left is the null distribution for this scenario. Based on the graphic, how many villagers in Mirabel's sample would need to share their thoughts on Bruno in order for Mirabel to have evidence to support the alternative hypothesis? Explain.

Sample Proportion of Villagers Who Talk about Bruno
(for Sample of Size 20)

Assessing Student Work

On a 0-10 point scale, what grade would you assign to each of these solutions?

Student Solutions

Solution 1:
Mirabel would need at least 16 to share their thoughts because 16/20 > 0.75.

Solution 2:
Mirabel would need at least 19 to share their thoughts because that would result in a small p-value.

Solution 3:
Mirabel would need at least 19 to share their thoughts. The null distribution specifies the statistics we would expect to see across repeated samples if the null hypothesis were true. Therefore, in order to provide evidence for the alternative hypothesis, we would need the statistic to fall into the upper tail region of the null distribution. The further in the tail, the stronger the evidence against the null hypothesis. The area under the curve to the right of the statistic is the p-value; with a statistic of at least 0.95 (19/20 individuals), the p-value would be very small, providing evidence in favor of Mirabel's statement.

Assessing Student Work

Consider the following criteria, *all* of which need to be met to successfully complete the problem; which solutions meet *all* criteria?

1. Provide a value (between 0 and 20) indicating the number of villagers that would need to share their thoughts.
2. Explanation must give a description of what the null distribution tells us or how it is constructed.
3. Explanation must state how a null distribution and sample statistic are used to determine the strength of evidence in the data (for example, how a p-value is computed).
4. Correct logic must be used.
5. Key statistical terminology should be used correctly.

Student Solutions

Solution 1:
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Solution 3:
Mirabel would need at least 19 to share their thoughts. The null distribution specifies the statistics we would expect to see across repeated samples if the null hypothesis were true. Therefore, in order to provide evidence for the alternative hypothesis, we would need the statistic to fall into the upper tail region of the null distribution. The further in the tail, the stronger the evidence against the null hypothesis. The area under the curve to the right of the statistic is the p-value; with a statistic of at least 0.95 (19/20 individuals), the p-value would be very small, providing evidence in favor of Mirabel's statement.

Principles of non–traditional grading

- **Transparent** learning outcomes

- **Assess** students based on **demonstrating** outcomes (not for points and thus there is no partial credit)
-
- Marks **indicate progress**

- **Multiple opportunities** to demonstrate each outcome.

Adapted from the *Grading Conferences 2020, 2021, & 2022*

Types of non-traditional grading

Standards- Based

- Students graded on completion of a set of standards
- Standards graded pass/fail
- Successful completion of a standard requires getting the correct answers and showing the appropriate work

Specifications

- Students graded on completion of a collection of assessments
- Each assessment is pass/fail
- Specifications for successful completion of an assessment is communicated in advance.

Contract (Ungrading)

- Grading contracts communicate what is required for every potential grade
- Students work toward the grade they want to achieve

Activity 1: Assessable Learning Outcomes

Bloom's Taxonomy
Divides learning into six domains: knowledge, comprehension, application, analysis, synthesis, evaluation.

Example:
*Given a description of a research goal or question of interest, **identify** the population and the parameter of interest.*

Activity 1: Assessable Learning Outcomes

Finks

Broadens Blooms to include outcomes that deal with interpersonal skills and being a lifelong learner.

Example:

Identify *the value of statistical methodology in the advancement of science as well as **state** its limitations.*

Activity 1: Assessable Learning Outcomes

Your Turn

- Determine your course & find your spot in the room.
  - Introductory Statistics
  - Probability & Statistics
  - Upper-Level Elective
- Use shared worksheets (found on webpage) to design assessable learning outcomes

Towards the end, we will direct groups to contribute to a collaborative Google Doc

Break Time!

Over the break, consider **which of the three main types of non-traditional grading you prefer** to develop for your course.

When we return, we will re-organize ourselves in the room based on your preferred primary grading scheme

Standards- Based	Specifications	Contract (Ungrading)

Standards- Based
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Specifications
- Students graded on completion of a collection of assessments
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Contract (Ungrading)
- Grading contracts communicate what is required for every potential grade
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Activity 2: Building a Syllabus

Decision 1: The system impacts the type of outcomes you need to construct.

System	Course-Level	Module-Level
Standards Based	?	x
Specifications Based	x	x
Ungrading	x	?

Activity 2: Building a Syllabus

Decision 2: The format of assessments in the course.

System	Individual Questions	Assignments	Bundles
Standards Based	x	?	?
Specifications Based		x	?
Ungrading		x	?

Activity 2: Building a Syllabus

Decision 3: The manner in which you will handle "repeated opportunities" to demonstrate learning.

Revise Attempts	Multiple Assignments	Tokens

Activity 2: Building a Syllabus

Decision 4: How do you map work completed to course grades?

More Outcomes	Higher-Order Outcomes	Combination

Wrap-Up

Discussion:

- Challenges
- Shared Resources
- Final Questions?

http://growthmindsetmemes.blogspot.com/

THANK YOU!!

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