USCOTS 2021
Engaging Everyone

Flexibility for Students to Demonstrate Understanding: Standards-Based Grading in Statistics Courses

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In 1-2 words, what is the goal of grading

What is Standards-Based Grading (SBG)?

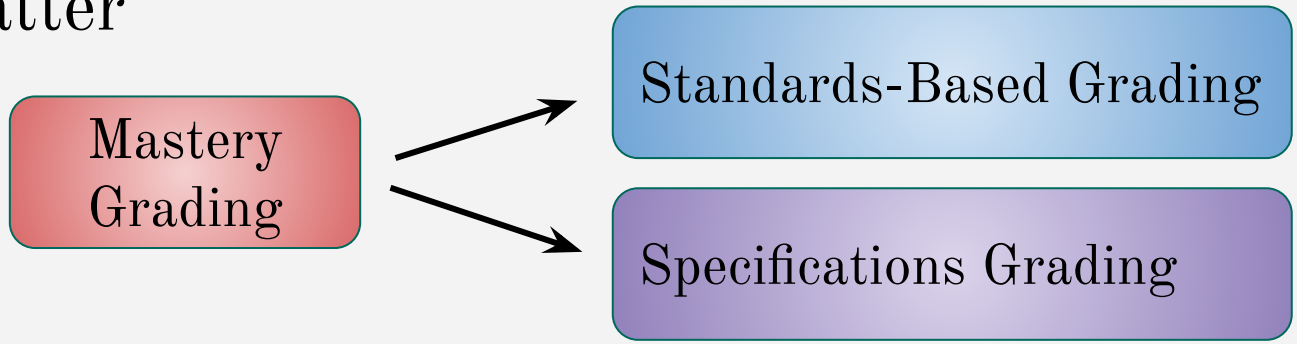
An alternative to “traditional” grading with the following principles:

- **Clear** measurable **learning outcomes** (standards)
- **Assessing** students based on whether or not they **understand** learning outcomes instead of a point-based grading system (e.g., no partial credit)
- Students have **multiple opportunities** to demonstrate their understanding of each learning outcome.
    - Students are not penalized for failing
    - Students can revise, redo, and resubmit their work to demonstrate their understanding

Adapted from the *Mastery Grading Conferences 2020 & 2021*

Words Matter

Other terms:



"Mastery" according to dictionary.com

1. Comprehensive knowledge or skill in a subject or accomplishment
2. Control or superiority over someone or something.

Adapted from the *Mastery Grading Conference 2021 presentation by Katie Mattaini*

Why Standards-Based Grading?

We were drawn to Standards-Based Grading as it:

- allows for more **flexibility**
- it is believed to be a more **equitable** assessment technique for students with diverse learning styles and background knowledge
- embraces **constructive failure** and promotes a **growth mindset**
- can help students feel comfortable and **confident** in their statistics abilities
- encourages **complete understanding** of topics

Assessable Learning Outcomes

Course: Probability & Statistics course, first semester

Topic: Discrete Random Variables

Learning Outcome Before SBG: *Understand a variety of probability distributions and real world situations that give rise to them*

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Learning Outcomes with SBG:

- *Construct a valid pmf for a discrete random variable based on real world set up*
- *Derive the pmf from a given cdf (and vice versa)*
- *Calculate probabilities/quantiles using a given pmf or cdf (by hand and with R)*
- *Calculate the expected value and variance for random variables and/or functions of independent random variables*
- *Identify which distribution (Binomial, Poisson, Hypergeometric, negative binomial & geometric) correctly models a given problem*

Assessable Learning Outcomes: Your Turn

Breakout Room Logistics

- Go to the shared Google Doc (link shared in the chat)
- Find the page corresponding to your breakout room group number

Activity Prompts

Part 1: Individual Reflection (~5 mins)

- Determine measurable outcomes important to your topic

Part 2: Group Discussion of Outcomes (~ 8 mins)

- Introductions (Name, pronouns, institution, favorite snack/beverage while grading)
- Discuss outcomes as a group and try to come to a consensus

Part 3: Group Discussion of Strategies (~ 5 mins):

- Identify one strategy used to determine learning outcomes (to share with large group)
- Identify one challenge or question related to determining learning outcomes (to share with large group)

Assessable Learning Outcomes: Share Back

What challenges and strategies did your group identify?

Growth Mindset & Feedback Cats: http://growthmindsetmemes.blogspot.com/

Assessable Learning Outcomes: Strategies

Our strategies:

- **Collaboration**
  - Brainstorming individually before discuss as group
  - Google Docs and regular meetings
- Use past exam or homework questions to help guide what objectives are important
- Discuss the importance of the learning outcome; link to Bloom's Taxonomy

Next Steps

- Determine grading rubric
- Determine reassessment structure

Implementing Standards-Based Grading

Participation

- Low-stakes, daily assignments graded on Met/Not Met (on completion)
- No reattempts

Homework

- Graded by question: Success (S), Growing (G), Not Yet Met (N); S receives credit
- Revise & resubmit (same question) within a week

Tests

- Graded by standard: Success (S), Growing (G), Not Yet Met (N); S receives credit
- Reattempt (same standard) before next test; typically 3 chances

Final Exam

- Graded by standard: Success (S), Growing (G), Not Yet Met (N); S receives credit
- Cumulative (subset of course standards)
- No reattempts

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Where to start? Implementing Small-Scale

Some considerations:

What aspect of the course could you implement SBG?

- Only use SBG for tests and exams where:
  - In a 15-week course, have 4 midterm exams (weeks 4, 7, 10, and 13)
  - Each exam covers ¼ of the course standards

Other ideas: Assignment, topic/chapter, project, computing lab, etc.

Where to start? Implementing Small-Scale

Some considerations (continued):

Will students revise their answers to the same questions or reattempt a new question linked to the same standard?

- Between exams, students can reassess standards which will comprise of new questions linked to the same standard.

Where to start? Implementing Small-Scale

Some considerations (continued):

How will students reassess?

- Between exams, students can reassess standards from the most recent midterm in-class on Fridays for a total of 3 attempts per standard

Other ideas: In-class or outside? Timeline? Number of reassessments allowed?

Where to start? Implementing Small-Scale

Some considerations (continued):

What grading rubric would you use?

- Student earn an “S” (success) or an “N” on each standard

Other ideas: Two/three/four tier? Letter or Number system?

Where to start? Implementing Small-Scale

Some considerations (continued):

How will you translate to a final letter grade?

- Overall midterm exam grade calculated by determining the percentage of standards that receive an “S”

Small-Scale SBG: Your Turn

Consider:

- What aspect of the course could you implement SBG? (Assignment, topic/chapter, exams, project, computing lab, etc.)
- Will students revise their answers to the same questions or reattempt a new question linked to the same standard?
- How will students reassess? (In-class or outside? Timeline? Number of reassessments allowed?)
- What grading rubric would you use? Two/three/four tier?
- How will you translate to a final letter grade?
- Other things to think about? What questions do you have?

Small-Scale SBG: Your Turn

Breakout Room Logistics

- Go to the shared Google Doc (link shared in the chat)
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Activity Prompts

Part 1: Individual Reflection (~8 mins)

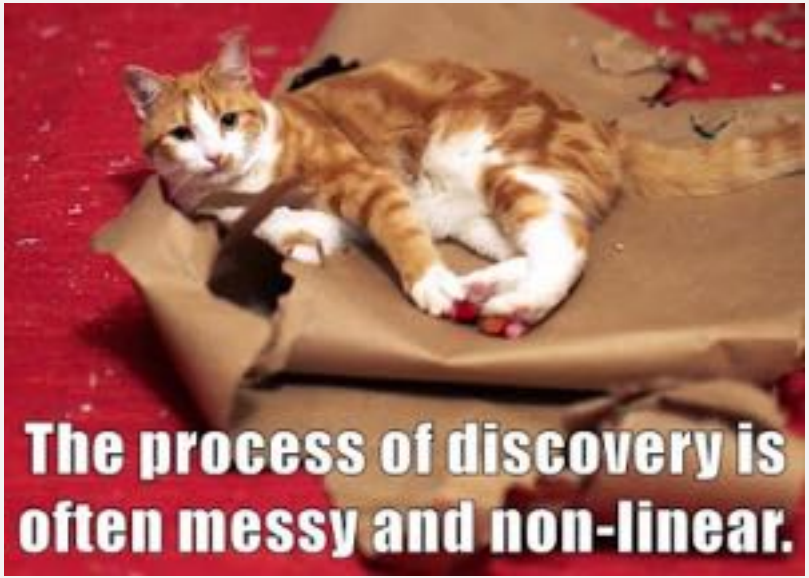
- Brainstorm ideas based on the considerations on the previous slide (and in the Google Doc)

Part 2: Group Discussion of Ideas (~ 2 mins/person)

- Discuss and compare ideas as a group
- Share reasoning and possible pros/cons to decisions
- Select one person to share an idea with the larger group

Small-Scale SBG: Share Back

What is one idea for implementing SBG your group discussed?



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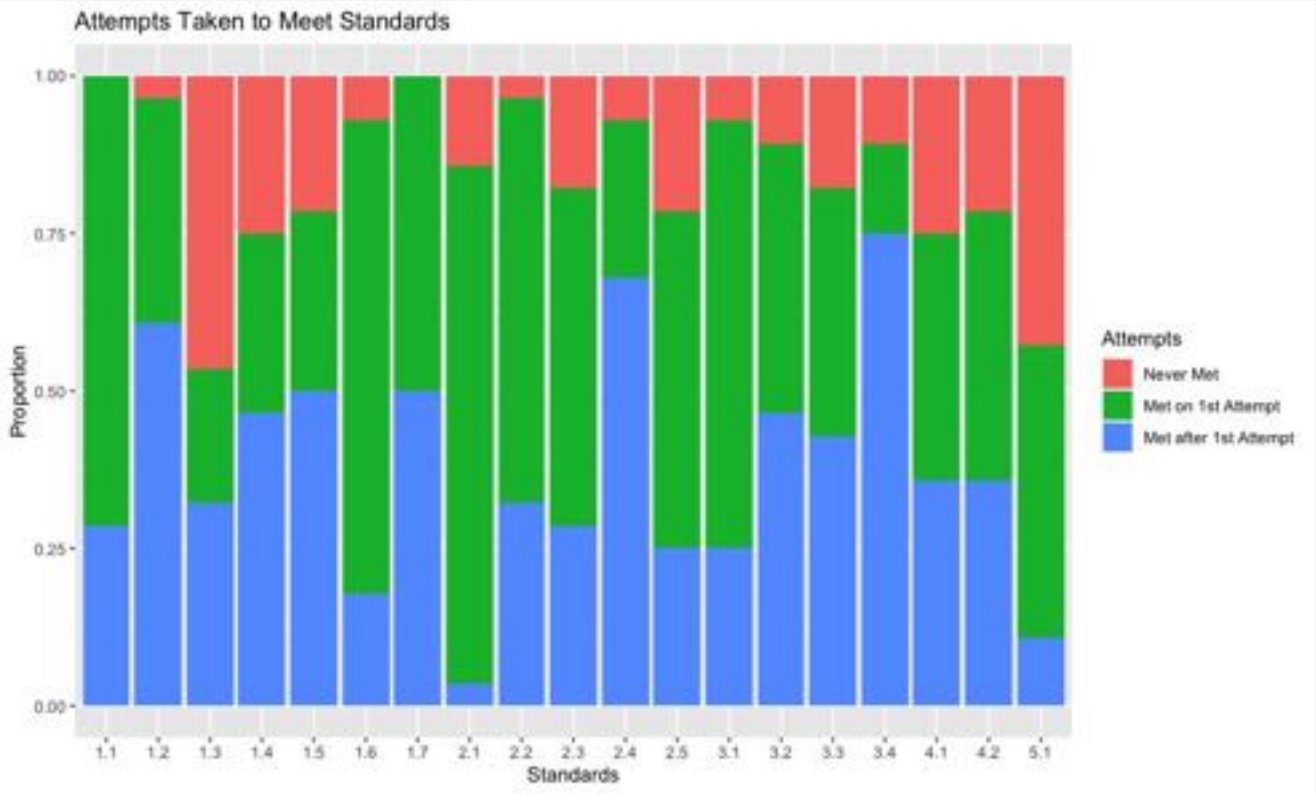
Challenges

- Developing assessable learning outcomes
- Reassessing vs Revising
- Understandable grading scheme
- Student buy-in
- Frequent grading sessions

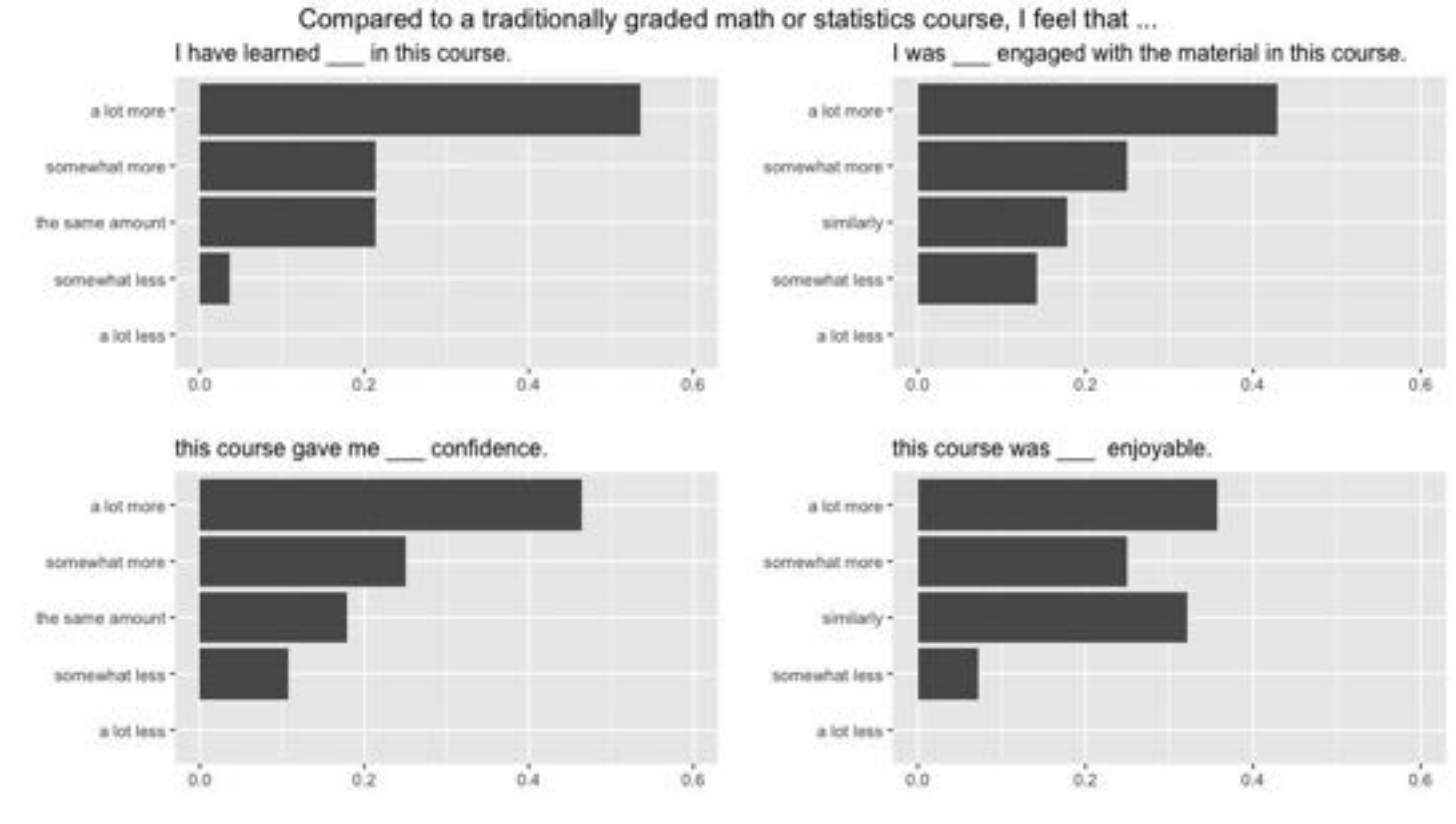
Benefits

- Student growth
- Students revisiting tests/assignments/topics
- Increased opportunities for student success
- Transparent outcomes
- Easily identify problem topics and struggling students
- Student buy-in
- Shorter grading sessions

Student Growth



Student Perspective



Student Perspective - What did you like LEAST about SBG?

No Partial Credit
it is frustrating when you are able to do a chunk of a problem, but the error is large enough to achieve a Growing and you kind of did all that work for nothing.

It can be very frustrating when you get close to passing a standard but not quite there. In a normal class where you might get 85%, which is fairly respectable, you end up getting it completely wrong. However, while it is frustrating, I think along with the ability to retry multiple times it ends up leading to better learning.

It was frustrating to get one problem right for a standard, but not the other, so you end up getting no credit.

Heavily Weighted Final
The only aspect I would recommend change for would probably be how the final is factored into the final grade. It just feels like the final holds too much weight in regards to the philosophy of standards based grading.

A Lot of Work
It's easy to fall behind if you're not keeping up with the work. I like that I have this type of grading for my upper level classes and in general. But I'm not sure if people would like it in their lower level courses.

Student Perspective - BEST aspects of SBG

Focus on Learning over Earning Points:
I really like that it tests our knowledge of the topic rather than our ability to get points.

I really liked that it gave me a chance to see when I didn't fully understand concepts because I have gotten so used to receiving partial grades that are high enough that I don't bother to look them over or care about the parts that I didn't get completely correct. I appreciated the opportunity to focus on the parts I didn't understand and work to make sure that I did understand, instead of focusing on my ability to just memorize for and pass a test.

Learning from mistakes
Allowing for corrections to be made and extra attempts to made allowed me to truly look back and learn from mistakes. This helped me grasp the material better and have a better understanding overall.

Reduced Test Anxiety:
I like that we get multiple attempts to do homework problems and tests. This ensures that we are fully understanding the material and alleviates some of pressure and anxiety that can occur during an exam.

Resources

See shared Google Folder with

- Link for PRIMUS special issue on Mastery Grading
- Link for Slack Workspace
- Link for *Grading for Growth* annual conference (previously Mastery Grading Conference)
- Link to Eric Reyes's StatTLC Blog Post
- Example syllabi
- Example Learning Outcomes

Thank you!

Questions?

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