Understanding the student perspective on mastery-grading

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Standards-Based (Mastery) Grading

- Assessment strategy based around the idea of the mastery of “outcomes”
  - We call these outcomes “goals” in our classroom

- Students are formatively assessed many times throughout the term and are assigned a score on their work for each goal individually

- Students are able to re-assess previously unmastered goals outside of class time to demonstrate mastery of the goal

- Students must score a certain amount of “mastery” points to pass the course
**“Scoring System” Used**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Exceeds expectations! Correct, complete, convincing, and clear with proper notation. Wonderful job!</td>
</tr>
<tr>
<td>3</td>
<td>Mastered Demonstrates understanding of relevant goal. May include some errors, but no additional study or review is needed.</td>
</tr>
<tr>
<td>2</td>
<td>Progressing Demonstrates partial understanding, but with a fundamental error, misunderstanding, or is incomplete. Needs review and revision.</td>
</tr>
<tr>
<td>1</td>
<td>Does not meet goal Not enough work to determine mastery. Attempt is not clear or not complete, or large error has been made. Needs review and revision.</td>
</tr>
<tr>
<td>0</td>
<td>Not assessable No work demonstrated.</td>
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Modified from D. Clark (GVSU) and R. Talbert (GVSU)
A brief on the course - MATH1228A/B

- “Methods of Finite Mathematics”
  - Basic counting, probability and random variables

- Mandatory course for psychology majors at King’s (along with an introductory statistical methods course)
  - 201 students total over fall and winter term – 172 students identified as “psychology” majors (~85%)

- Taught at both main campus and King’s – often using same lectures, text, and assessments

- History of poor performance in course at King’s
  - 2019/20 and 2020/21 academic years – King’s average was just > 50%
Assessment Structure for 2021/22

- Attempted to stay away from using traditional assessment terminology
  - Quizzes → “Mastery Checks”
  - Midterms → “Uber Mastery Checks”
  - Final Exam → “Final Uber Mastery Check”

- Six MCs (5 goals per check)
- Two UMCs (~10 mandatory checks, and a large amount of “optional” checks)
- One FUMC (~12 mandatory checks, and all previously checked goals)

- **50 goals** total in Fall 2021 and **52 goals** total in Winter 2022
Examples of Goals

PR12  Finish an incomplete probability tree by stating and using the properties of probability trees.

PR13  Given a verbal description of a problem, construct a probability tree and use the tree to answer word problems.

PR14  Use Bayes’ Theorem to calculate probabilities.

PR15  Calculate the probability of $k$ successes given $n$ Bernoulli trials.

PR16  Calculate the probability of at least $k$ successes or at most $k$ successes given $n$ Bernoulli trials using indirect counting methods.
## Grading Structure

<table>
<thead>
<tr>
<th>Grade</th>
<th>Learning Goals</th>
<th>MathMatize (percentage of quizzes with mark of 90% or greater)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (85)</td>
<td>$\geq 42$ goals graded as 3 or 4 with at least twenty 4’s</td>
<td>90% (approximately 15 activities)</td>
</tr>
<tr>
<td>B (75)</td>
<td>37 – 41 goals graded as 3 or 4 with at least fifteen 4’s</td>
<td>80% (approximately 12 activities)</td>
</tr>
<tr>
<td>C (60)</td>
<td>31 – 36 goals graded as 3 or 4</td>
<td>70% (approximately 11 activities)</td>
</tr>
<tr>
<td>D (55)</td>
<td>26 – 30 goals graded as 3 or 4</td>
<td>60% (approximately 9 activities)</td>
</tr>
<tr>
<td>F (&lt;50)</td>
<td>Have not fully completed any row.</td>
<td></td>
</tr>
</tbody>
</table>
End of course findings (general)

- Course average in fall term 2021 – 85% across two sections of 126 students
- Course average in winter term 2022 - 77% from one section of 75 students
  - Two sections taught “traditionally” - 61% average from 103 students
- Attendance was higher than usual - enrollment was capped at 75 in each of my sections
- > 95% of students “re-assessed” at least one goal throughout the term – much higher than expected
  - Constant stream of students (in both terms) during student hours
- **Downfall** – no check of retention of material; “one and done”
Student Perspectives Survey

- Interested in the student perspective on this assessment model (*data-driven pedagogy*)
  - Stress and anxiety?
  - Confidence?
  - Learning?

- Received ethics approval from King’s to run a survey to collect student feedback after the course was completed
  - Wished to collect during the term (“check-ins”) but process took longer than expected

- Data is still being collected – results and findings are thus preliminary
Some interesting findings

● 85% of responders had never had a course that implemented mastery grading

● 70% of responders stated that their initial anxiety and stress in relation to this course was “somewhat high” or “high”
  ○ “I am bad at math”
  ○ “...heard this was a hard course...”

● Majority reported being fearful of “mastery grading” upon initially learning about
  ○ “Confusing structure”
  ○ “Never encountered before”
Some interesting findings

- All respondents agreed with the following:
  - Mastery grading was fair
  - Mastery grading allowed me to feel like I could succeed and do well
  - Mastery grading kept me engaged with the course content throughout the whole term
  - I would be excited to take another course that utilizes a mastery grading assessment structure

- Some additional comments:
  - “Mastery grading allowed me to actually learn and retain the content of the course. It alleviated stress resulting in higher performance.”
  - “I very much enjoyed the master grading style, I could definitely notice a difference in my learning as I was less stressed going into tests/quizzes and it was reassuring to know I had the opportunity to improve on different course content anytime throughout the term which was way less discouraging then what I experience in other courses”
  - “… I really enjoyed the grading system and I think it is a more accurate way of determining a students understanding of the course by giving them the opportunities to succeed.”
Where do we go from here?

- The assessment structure needs some adjustments on the instructor end
  - Workload ........ ugh

- Students seem to enjoy this style of assessment – especially in a mathematics course (task based)
  - Less stress on tests and quizzes
  - More opportunities to do well – which apparently students like! Who knew?

- Provide student feedback to other instructors to demonstrate the need for a shift in assessment methods
Questions?

https://college-bridge.org/our-services/conferences/the-grading-conferences/
Land Acknowledgement

We acknowledge that the King’s University College campus is situated on the traditional territories of the Anishinaabek, Haudenosaunee, Lūnāneewak, and Chonnonton peoples, all of whom have longstanding relationships to the land of Southwestern Ontario and the City of London. The First Nations communities of our local area include Chippewas of the Thames First Nation, Oneida Nation of the Thames, and Munsee Delaware Nation. In our region, there are eleven First Nations communities, as well as a growing indigenous urban population. King’s University College values the significant historical and contemporary contributions of local and regional First Nations, and all of the Original Peoples of Turtle Island (also known as North America).

https://native-land.ca/