Leveraging Tags within Gradescope for Improved Student Feedback.

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Gradescope User Summit 2021
This presentation will share the approach taken by a group at the University of Illinois Urbana-Champaign to present assessment data to students using tags.

Background and motivation on assessment needs in engineering programs.

Capabilities of Gradescope and tagging protocol.

Leveraging Gradescope data with tagging to increase student understanding of performance.
Many engineering programs struggle with assessment on many levels

When grading assignments, we are comparing student performance to a ‘correct’ answer

- How could he/she miss this problem?
- What else is she missing?
- Do I need to reach out to this student?
- What do I need to do to improve?
- What exactly did I miss?
- Do I really need to master this to be an engineer?
We followed the NSF I-Corps program training and collected surveys and conducted focus groups from employers, faculty, students, alumni and peer institutions.

Faculty and administrators prefer high-level overall performance on topic areas of their interest and help identifying learning gaps

Faculty want

• Norm-referenced and criterion-based data should clearly define the groups of students who need more intensive instruction and the groups of students who are at or above level.

• Information to help them effectively plan at a class level and manage instructional time for whole-class and small group instruction,

Administrators want

• Information to better assign resources across cohorts.

• Information that highlights learning gaps in a course and across the curriculum
Focusing on the cohort level can help a program make decisions on

• Curriculum changes
• Outcomes attainment (ABET)
• Effectiveness of different teaching methods
• Effect of changes
• Etc.
Students crave actionable and timely feedback above all else learners are mostly focused on action related to course level performance

- Information that highlights learning gaps needed to pass courses (worried about GPA)
- Feedback that helps them direct their own learning
- Timely feedback so that they can correct gaps before they affect performance
- Benchmarks to situate their learning amongst peers
Where the faculty, administrators, and students all meet are not in grades but in outcome-level feedback.
We have worked with faculty to create tag lists in their courses that provide meaningful feedback to both instructor and student.
Try to focus outcomes on key concepts and skills used in the course, focusing on ones that you want to track long-term

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
   a. Identify key components and algorithms necessary for a solution.
   b. Produce a solution within specifications.
   c. Analyze at least two possible solutions to a given problem and select the best solution for the given problem.
   d. Use discrete mathematics techniques and algorithms.

Types of algorithms
Graph search
Binary trees
Tree traversal
Data mining
You don't have to reinvent the wheel, you can find lists for outcomes and tags to use as a starting point.
Here is an example from a controls course that we worked with last year

Linear time invariant systems
Solution in the time domain (ordinary differential equations – ODEs)
Solution in the Laplace domain (transfer function – TF)
Poles and zeros; their physical meaning
Stability: stay on the left-hand plane

1st order systems
Impulse, step, and other responses
Time constant
Steady state

2nd order systems
Impulse, step, and other responses
Dominant pole (slow/fast poles)
Over-/critically/under-damped response
Damping ratio, natural frequency, damped oscillation frequency
Rise time, settling time, peak time, overshoot
Steady state

State space: formulation only
Eigenvalues of system matrix ↔ system poles

Certain physical implementations
Flywheel
DC motor with flywheel load and with/without inductance
Simple RC / RL / RLC circuits, impedance and voltage divider
More generally: physical model ↔ ODE ↔ system behavior

Week # | Lecture | Assessment
--- | --- | ---
1 | Topic 1 | Quiz
2 | Topic 2 | HW
3 | Topic 3 | Quiz
4 | Topic 4 | HW
5 | Topic 5 | Quiz
6 | Topic 6 | HW
Turn Grading into Learning

Grading should provide **actionable feedback** to both students and instructors

- Help **students** learn
- Help **instructors** pace and direct instruction
- Help **instructors** compose assessment

Gradescope helps by decreasing grading time, increasing consistency, and providing insights into student learning and assessment quality.
This presentation will share the outcomes of a Gradescope and University of Illinois Partnership to improve assessment and student learning in a curriculum.

Motivation and assessment needs in engineering programs.

History and capabilities of Gradescope.

Leveraging Gradescope to improve student learning across courses.
Any of the assignment formats can be used for this approach
By simply grading assignments as I usually would with a rubric, I am also collecting the tagged data scores.
View performance statistics from a problem based on overall performance

Assignment Statistics

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>Assignment mean</td>
<td></td>
<td></td>
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Hw#3 28.0 points

<table>
<thead>
<tr>
<th>MINIMUM</th>
<th>MEDIAN</th>
<th>MAXIMUM</th>
<th>MEAN</th>
<th>STD DEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>57.14%</td>
<td>92.86%</td>
<td>100.0%</td>
<td>91.23%</td>
<td>8.47%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>POINTS</th>
<th>MEAN</th>
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</thead>
<tbody>
<tr>
<td>1: 4.10</td>
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Tags: algebra, Energy balance, Heat, Assumptions
View performance statistics based on tags for an assignment

Assignment Statistics

Hw#3  28.0 points

<table>
<thead>
<tr>
<th>TAG</th>
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<td>100.0%</td>
<td>91.23%</td>
<td>8.47%</td>
</tr>
<tr>
<td>Energy balance</td>
<td>1 question</td>
<td>4 points</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat</td>
<td>3 questions</td>
<td>20 points</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Show Questions  Show Tags
Gradescope allows you to export your data in many different ways for additional analysis.
This presentation will share the outcomes of a Gradescope and University of Illinois Partnership to improve assessment and student learning in a curriculum

Background and motivation on assessment needs in engineering programs

History and capabilities of Gradescope

Leveraging Gradescope to improve student learning across courses
Our code scrapes information from the CSV files and creates tag-based summaries beyond the basic bar charts.
Student x:
Because the data is outside of the assignment now, we can track cumulative performance across a course or multiple courses.
Mail merge allows me to distribute these to students privately along with a message for them.
Faculty use results in different ways

Review overall performance to inform

- Tailored office hours
- Supplemental lecture or reviews
- Retakes or performance informed grading
- Inform course design and assessment design
- Compare cohort performance across years - assessment for course changes

Individual consultations with students on performance
Students use results in different ways

- Identify areas to study for exam preparation
- See tangible progress in skills/knowledge regardless of grades
- Request help on specific topics
In summary, by leveraging the tagging function in Gradescope, you can provide actionable feedback to students within a class, track progress on skills and concepts across a course or curriculum, and simplify your continuous improvement assessment process.

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