Cultivating a Faculty Learning Community in Implementing Mastery Specifications Grading to Increasing STEM Students' Growth Mindset

Presenters: Patrick Hong, Renée Link, and Megan Linos

October 15, 2022
Speakers from UC Irvine

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Faculty Development
Project PI

Renée Link
Chemistry
Faculty Trainer

Patrick Hong
Engineering
Program Participant
Faculty Peer Coach
A California Learning Lab Project

An initiative of the California Governor’s Office of Planning and Research in partnership with the Foundation for California Community Colleges, Learning Lab aims to improve learning outcomes and close equity gaps across California’s public higher education segments, particularly in the STEM disciplines, by leveraging technology tools and the science of human learning to foster student success in online and hybrid learning environments.

https://tea.dtei.uci.edu/
A California Learning Lab Project

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The TEA Concept

**GOAL**
Boost STEM students’ and faculty members’ Growth Mindset

**STRATEGY**
Cultivate learning via a Mastery Path

**TOOL**
Support the learning experience with Specifications Grading

Image by mohamed Hassan and gdakaska from Pixabay
Program Structure and Timeline

**PLANNING**
6/2020 - 2/2021
- Program Planning
- Develop TEA Curriculum
- Recruit training experts and guest speakers
- Organizing pre-mini webinars

**REDESIGN**
3/2021 - 7/2021
- The Faculty Peer Coach Training Program
- The Mini-Seminars
- The STEM Course Redesign Program (Boot Camp)

**IMPLEMENTATION**
8/2021 - 6/2022
- Fall 2021 Teaching Experiment
- Bi-monthly Faculty Learning Community
- Winter/Spring 2022 Teaching Experiment
- The TEA Summit & Faculty Showcase

Image Created by: Youth Voices
## The Core Support Team

### Training Experts
- 8 webinars by expert specs grading faculty
- UCI, Emory, & GA Tech faculty led Summer Boot Camp
- UCI, Emory, & GA Tech faculty trained peer coaches

### Peer Coach
- Trained peer coaches facilitate faculty learning communities and provide feedback
- Peer coaches had some prior experience with specs grading

### Instructional Designer
- On each campus an instructional designer is available to the faculty learning community for extra, as-needed support

Image by Radoan Tanvir from Pixabay
What is Specifications Grading?

Renée Link
Chemistry, UC Irvine
What Is Specifications Grading?

Nilson, L. B.; Stanny, C. J. Specifications Grading: Restoring Rigor, Motivating Students, and Saving Faculty Time; Stylus Publishing: Sterling, VA, 2014


Developed by Annie S. Ditta and Goldberry Long, UC Riverside
Key Components of Specifications Grading Systems

- Revise/Resubmit/Reassess
- Rubrics
- Token Economy
- Grade Bundles
- Buy-In

Icon by DinosoftLabs, Freepik, & Flaticon.
Essential Training
Elements of the
Teaching Experiment
Academy (TEA)

Renée Link
Chemistry, UC Irvine
Ten Learning Modules

1. Why Specifications and Mastery Grading?
2. Full vs. Partial Course Conversion
3. Designing Letter Grade Bundles
4. Peer Feedback on Grade Bundles
5. Revision, Resubmission, and Reassessment
6. Tokens! Design Your Token Plan & Learn to Deal With the LMS
7. Rubrics - What Do You Have? What Do You Need?
8. Designing Rubrics/Converting Existing Rubrics
9. Buy-in/Meet with Peer Coaches and Assess Where You Are!
10. Game Plan, Consider Assessing and Disseminating
TEA Program Highlights

- 7 Preparation Mini-Webinars
- Peer Coach Preparation Training (beta test for Summer Boot Camp)
- 2-week Summer Boot Camp (co-led by master trainers and peer coaches)
- 4 Post-Technology Workshops
- Curriculum available on Canvas LMS
- Bi-Monthly Faculty Learning Community Gathering
The 10-day Boot Camp Training

The Daily Activities

- 2-hour check-in and collaboration Zoom meeting
- Milestones
- Reflective Discussion
- Reading varied: Specifications Grading by Linda Nilson, journal articles describing specs grading implementations
Lesson Learned: Reorder the Ten Learning Modules!

1. Why Specifications and Mastery Grading?
2. Revision, Resubmission, and Reassessment
3. Tokens! Design Your Token Plan & Learn to Deal With the LMS
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10. Game Plan, Consider Assessing and Disseminating

Although starting with LOs and grade bundles might be “ideal”, for most faculty starting with revision and reassessment provides a more concrete starting point.
Teaching Showcase

Patrick Hong
Engineering, UC Irvine
ENGR 190W is an upper-division course designed to provide students with the tools to plan, research, organize, edit, and evaluate various forms of oral and written technical communication needs in the professional world.
What if students focused on Mastery Learning rather than just Grades?

<table>
<thead>
<tr>
<th>Total</th>
<th>Written Mastery I 20% of grade</th>
<th>Written Mastery II 25% of grade</th>
<th>Verbal Mastery I 12% of grade</th>
<th>Verbal Mastery II 13% of grade</th>
<th>Teamwork Mastery 15% of grade</th>
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<tbody>
<tr>
<td>77.88% B</td>
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<td>82.01% B+</td>
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<td>81.87%</td>
<td>80.09%</td>
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<tr>
<td>82.3% B+</td>
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<td>82.4% B+</td>
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</table>

[Table showing various mastery grades and sections with ratings like Exemplary, Satisfactory, Passing, Not Assessable, No Effort.]

[Diagram showing a question mark with a red arrow pointing to a specific section of the table.]
Before Spec Grading - Assignments as Student Learning Outcomes

Assignment Focused
- Flipped Classroom
- Active Learning
- Assignment Based Grading

Accreditation Board for Engineering and Technology (ABET) Learning Outcomes

ENGR 190W Course Learning Outcomes

My Course Assignments with Assessment Rubrics

Technical Writing, Speaking, and Teamwork
### Before Spec Grading - Assignments as Student Learning Outcomes

**Assignment Focused**
- Flipped Classroom
- Active Learning
- Assignment Based Grading

<table>
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<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Participation (Class Attendance, Baseline Assessments, Peer Editing)</td>
<td>XX%</td>
</tr>
<tr>
<td>Exercises (Pre-Lecture Videos, In-Class Work, Homework)</td>
<td>XX%</td>
</tr>
<tr>
<td>Quiz 1/Quiz 2</td>
<td>XX%</td>
</tr>
<tr>
<td>Quiz Final</td>
<td>XX%</td>
</tr>
<tr>
<td>Individual Paper A</td>
<td>XX%</td>
</tr>
<tr>
<td>Individual Paper B</td>
<td>XX%</td>
</tr>
<tr>
<td>Group Paper A</td>
<td>XX%</td>
</tr>
<tr>
<td>Group Paper B</td>
<td>XX%</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>
Before Spec Grading - Assignments as Student Learning Outcomes

Assignment Focused
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- Active Learning
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Accreditation Board for Engineering and Technology (ABET) Learning Outcomes

ENGR 190W Course Learning Outcomes

My Course Assignments with Assessment Rubrics

Technical Writing, Speaking, and Teamwork
Mastery Focused

- Flipped Classroom
- Active Learning
- Mastery Based Grading

Accreditation Board for Engineering and Technology (ABET) Learning Outcomes

ENGR 190W Course Learning Outcomes

My Course Assignments with Assessment Rubrics

Realigned assignments with Mastery Learning, added effective lifelong learning coaching.

Growth Mindset, Grit, and Agency - Lifelong Learning

Writing, Speaking, Teamwork
Mastery Focused

- Flipped Classroom
- Active Learning
- **Mastery Based Grading**

**Accreditation Board for Engineering and Technology (ABET) Learning Outcomes**

**ENGR 190W Course Learning Outcomes**

**My Course Assignments with Assessment Rubrics**

**Growth Mindset, Grit, and Agency - Lifelong Learning**

Realigned assignments with Mastery Learning, added effective lifelong learning coaching.

**Writing, Speaking, Teamwork**
# After Spec Grading - Competency-Based Mastery Learning

### Mastery Focused
- Flipped Classroom
- Active Learning
- Mastery Based Grading

### Realigned assignments with Mastery Learning, added effective lifelong learning coaching.

<table>
<thead>
<tr>
<th>Mastery Category</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Written Mastery I</td>
<td>XX%</td>
</tr>
<tr>
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</tr>
<tr>
<td>Verbal Mastery I</td>
<td>XX%</td>
</tr>
<tr>
<td>Verbal Mastery II</td>
<td>XX%</td>
</tr>
<tr>
<td>Teamwork Mastery (Peer Evaluations, Deadlines, etc.)</td>
<td>XX%</td>
</tr>
<tr>
<td>Lifelong Learning Mastery: Growth Mindset (Class Discussions, Quizzes, etc.)</td>
<td>XX%</td>
</tr>
<tr>
<td>Lifelong Learning Mastery: Grit &amp; Agency (Attendance, Lecture Videos, etc.)</td>
<td>XX%</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Key Considerations for Spec Grading Mastery Learning Adoption:

- Is the pedagogy (lectures, tasks, assignments, projects, etc.) aligned with Mastery Learning?
- What does it mean to give students A, B, or C grades?
  - Is it an absolute judgement on their potential?
  - Is it a snapshot of their mastery during the course period?
  - Or is it just an indication of the remaining gaps needed and can be filled even after the course is over?
- Does A, B, or C have to follow the traditional respective 90%, 80%, or 70% scale?
Outcomes and Impact

SPECIFICATIONS
GRADING

Megan Linos
Project PI and
Director in LX Design and
Online Education
Hypothesis and the Three Targeted Research Areas

Mastery learning supported with technology and implemented with specifications grading is beneficial for student success and in alignment with growth mindset theory

1. Understanding and Learning the Course Content
2. Self-efficacy Beliefs
3. Student engagement
Student Post-Pre Survey

Student Participants: **571**
- Fall 2021: **61**
- Winter/Spring 2022: **520**

Demographics
- Underrepresented (URM)
- First Generation
- Low Income
  - Federal Pell Grants
  - Financial Aid
Understanding and Learning the Course Content

Increased my **intelligence** about the subject matter

Increased my **understanding** of the subject matter

Increased my **academic performance** in this course
Understanding and learning course content

- **Positive impact:**
  - First-Gen: 66.96%
  - Non-First Gen: 64.63%

- **Neutral:**
  - First-Gen: 20.61%
  - Non-First Gen: 24.34%

- **Negative impact:**
  - First-Gen: 11.70%
  - Non-First Gen: 10.31%
Understanding and learning course content

- Positive impact:
  - Financial aid: 66.42%
  - No Financial aid: 65.94%

- Neutral:
  - Financial aid: 21.93%
  - No Financial aid: 22.19%

- Negative impact:
  - Financial aid: 11.40%
  - No Financial aid: 10.94%
Understanding and learning course content

Bar chart showing the distribution of feedback categories for URM and Non-URM students:

- **Positive feedback**:
  - URM: 65.29%
  - Non-URM: 65.49%

- **Neutral**:
  - URM: 23.18%
  - Non-URM: 21.92%

- **Negative feedback**:
  - URM: 11.52%
  - Non-URM: 11.15%
Self-efficacy Beliefs

- Increased my ability to **overcome challenges** and achieve my goals
- Increased my ability to **use feedback to improve my learning**
- Increased my ability to **learn from my mistakes**
- Increased my ability to **take risks** while learning
- Increased my ability to **enjoy challenging assignments**
- Increased my ability to **set goals and devise a plan** to achieve them
Self-efficacy beliefs

Positive feedback
- URM: 68.26%
- Non-URM: 65.11%

Neutral
- URM: 19.19%
- Non-URM: 23.43%

Negative feedback
- URM: 12.04%
- Non-URM: 9.65%
Student Engagement

- Increased my **engagement** in the class
  - Strongly agree: 37.69%
  - Agree: 26.15%
  - Neither agree nor disagree: 15.38%
  - Somewhat disagree: 9.81%
  - Disagree: 8.85%
  - I rather not answer: 2%

- Increased my **confidence** taking this course
  - Strongly agree: 33.65%
  - Agree: 35.77%
  - Neither agree nor disagree: 15.96%
  - Somewhat disagree: 8.46%

- Increased my **curiosity** for the subject matter
  - Strongly agree: 26.54%
  - Agree: 30.38%
  - Neither agree nor disagree: 28.65%
  - Somewhat disagree: 6.73%
  - I rather not answer: 6.73%

- Decreased the level of **stress** in the course
  - Strongly agree: 27.31%
  - Agree: 38.85%
  - Neither agree nor disagree: 20.77%
  - Somewhat disagree: 6.35%
  - Disagree: 5.58%
More Information and Teaching Showcase Examples

https://tea.dtei.uci.edu/involvement/tea-summit/faculty-showcase-videos/