

Standards-Based Grading in a Core Engineering Course

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Standards-based grading provides a **clear way for students to learn from their mistakes** and results in grades that **accurately reflect student achievement of the learning outcomes.**

Course Background

C&PE 221 – Chemical Engineering Thermodynamics I

Number of students: 70

Student level: sophomore

Demographics:

47% male, 34% female, 4% nonbinary

76% White, 16% Asian, 7% Hispanic, 2% Black

My Goal

Implement standards-based grading, including reassessment strategies that promote learning from feedback without reducing class time.

Course Redesign

1. Revised learning objectives for standards-based grading, using language from Bloom’s taxonomy.
2. Aligned homework, discussion, and assessment questions to learning objectives.
3. Opportunity to rework every homework assignment.
4. Seven assessments with four questions for each learning objective. Mastery is demonstrated by receiving “Achieved” on two questions.

Grading

LO1–LO15 – Content learning objectives, ~ 1 / week

✓ Achieved

○ Not Yet

LO16 – Points for homework, lecture attendance

LO17 – Point for discussion, discussion attendance

LO1–LO15 # Mastered	LO16–17	Grade
14–15	> 85%	A
	< 85 %	A-
12–13	> 85%	B+
	< 85%	B
11	> 85%	C+
	< 85%	C
10	—	D
< 10	—	F

Survey Responses

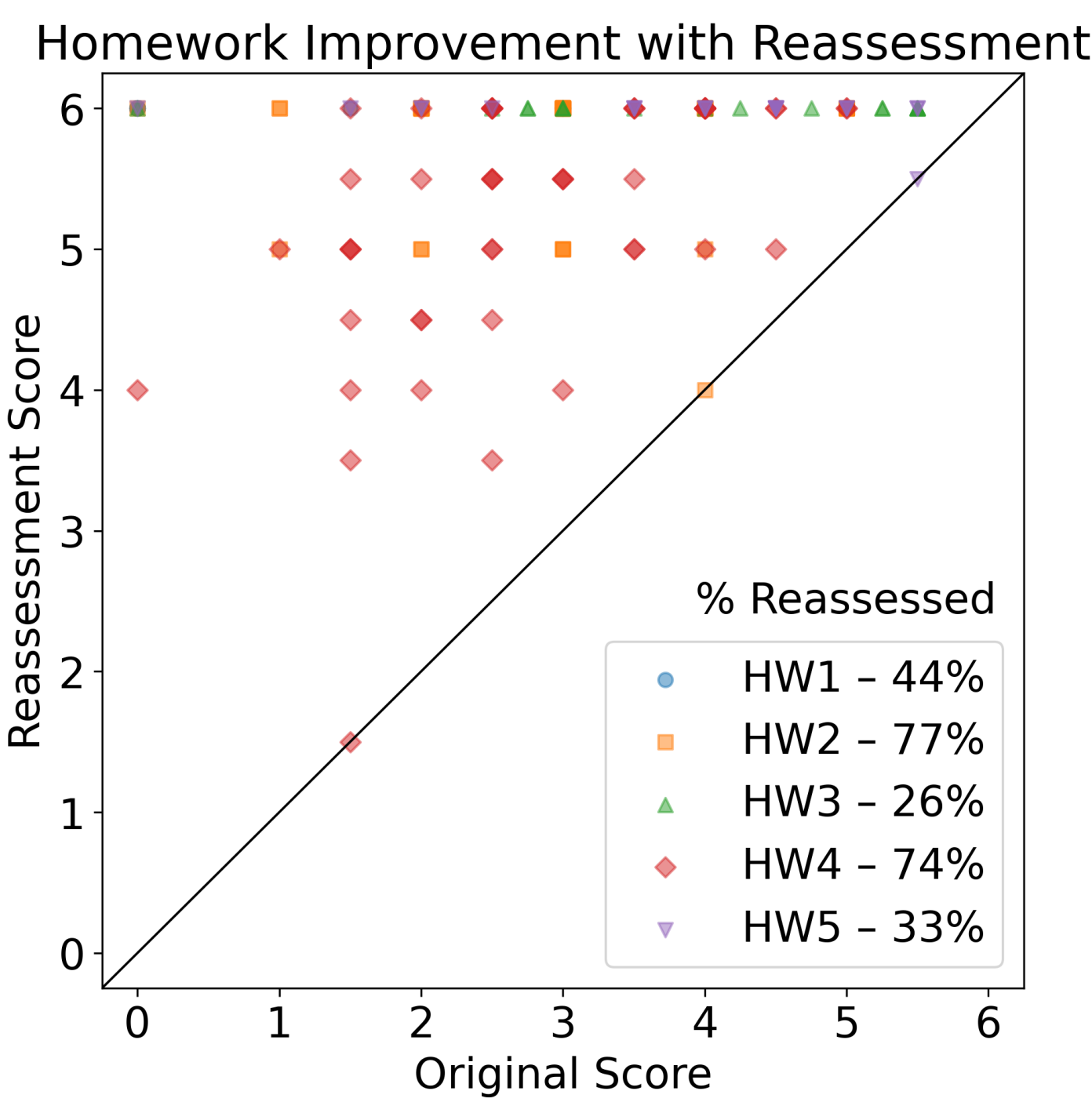
“This grading reflects my understanding far better than traditional systems.”

“It motivates me to learn the actual material rather than focus on getting a good grade.”

“I appreciate having multiple chances to reach the learning objectives.”

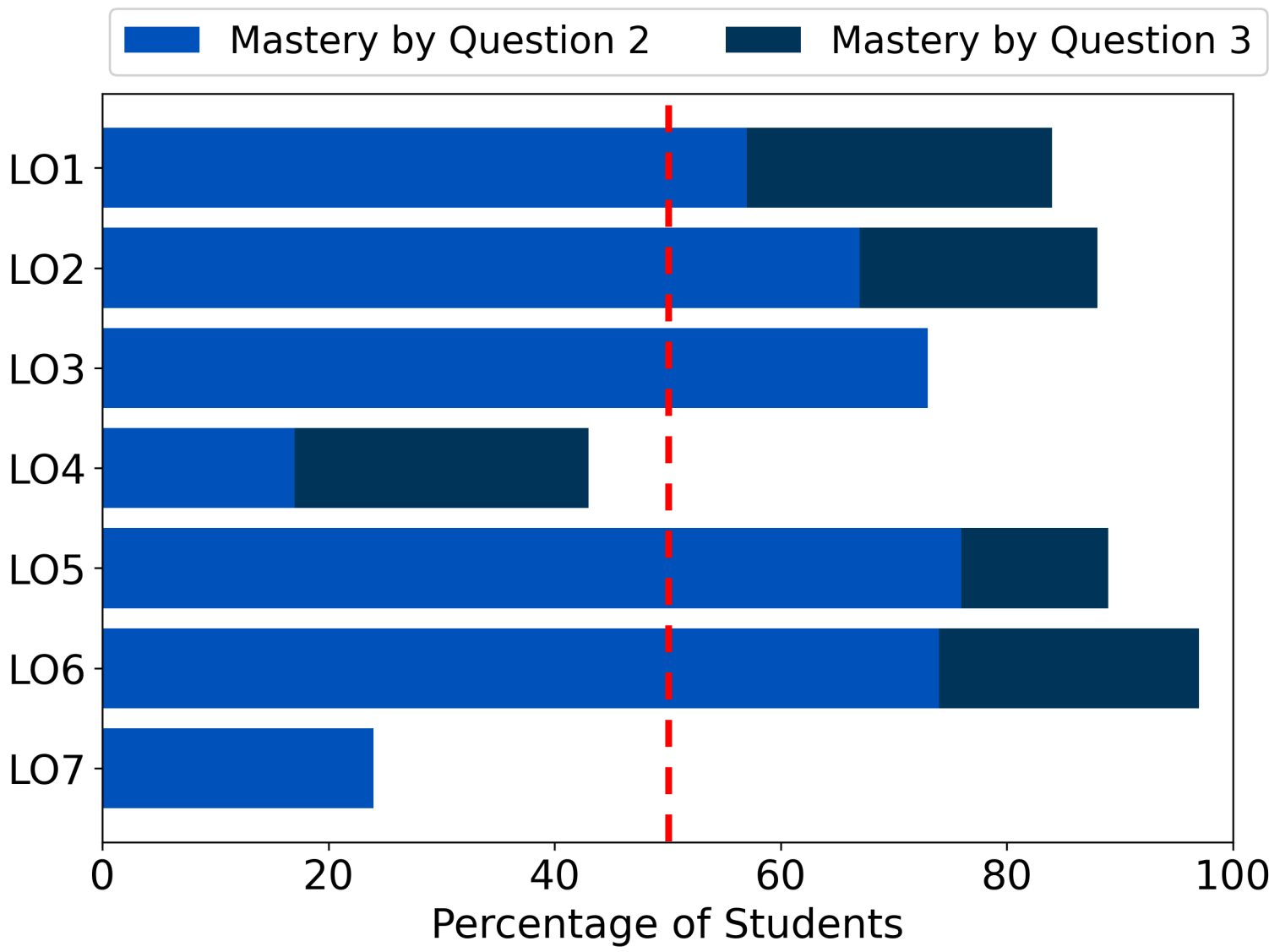
Homework Reassessment

- **46–77%** of students opted into homework reassessment, depending on the assignment.
- **>97%** of students improved their score.
- Reassessment is used strategically by the students, not indiscriminately.



Assessments

Many learning objectives achieve >65% mastery by question 2, and >85% mastery by question 3.



More conceptually demanding objectives (LO4, LO7) show delayed mastery for a majority of the class.

