



Thesis Defense

Computer Science Master's Program

“Challenges and Opportunities of Mastery-Based Learning: A Student-Centered Analysis in an Upper-Division Programming Languages”

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Abstract:

Traditional grading structures in computer science courses reward performance on a few high-stakes assessments that may not accurately reflect a student's mastery of concepts. Mastery-Based Learning (MBL) offers students multiple opportunities to demonstrate understanding through iterative feedback and reassessment, promoting their persistence and self-regulation. However, MBL can promote student behaviors like procrastination, “minimal effort” attempts, or de-prioritizing the course in favor of other courses with inflexible deadlines, which may undermine its effectiveness. This study investigates how students navigated MBL in an upper-division computer science course at Cal Poly in San Luis Obispo. The course explores the fundamentals of programming language theory and implementation, covering concepts like functional programming, expressions, and functions.

Using a mixed-methods approach, we analyzed quantitative data (pacing, quiz and assignment attempts, progression across attempts, and mastery achievement) and qualitative interview data. This study is guided by two central research questions: How do students navigate mastery-based learning in an upper-division computer science course, and what factors contribute to or hinder their success in this learning environment? Specifically, we evaluate student navigation by examining assignment submission timing patterns, the impact of resubmission opportunities, mastery attainment, and students' perceptions of mastery.

Findings from this study contribute to understanding the student experience within MBL. These insights provide evidence-based recommendations to enhance the design and implementation of MBL in computing courses, aiming to balance flexibility and accountability to improve learning outcomes and student well-being.

Date: Wednesday, June 10th, 2026

Time: 11:00 AM – 1:00 PM

Location: 14-238b

Zoom: <https://calpoly.zoom.us/j/85745221047>

Committee: Dr. Kazerouni, Dr. Keen, Dr. Dalbey

