

Advanced Education @ Scale: Feedback Isn't Cheap But It's Effective

Spencer Wilson

Overview

- Problem: teaching many people hard topics effectively is hard
- Background: Scale, Effectiveness
- Proposal: ???
- Implementation: 4 Phased Interview
- Experiment: TA discussions
- Results: Value and Concerns
- Future Work
- Summary

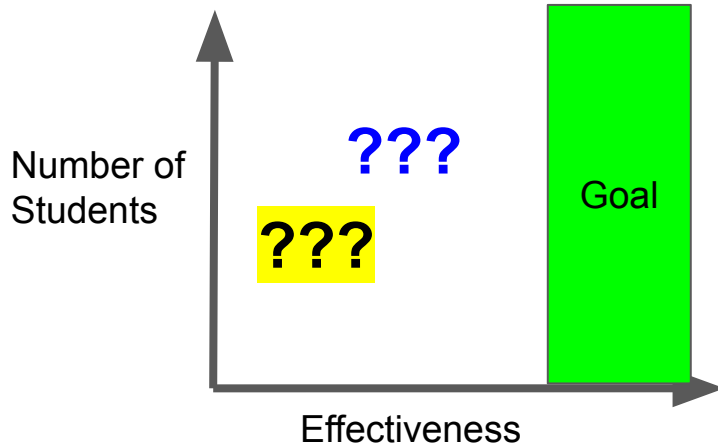
Problem: teaching many people hard topics well is hard



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Background: Matrix of Scale and Effectiveness



- Principles of Programming Languages, lovingly called “PPL” has two versions
- Where do we plot these course?
- **Version 1**: Project Based
- **Version 2**: Lecture Based

Background: Scaled teaching

- Provide consistent learning opportunities to as many students as possible



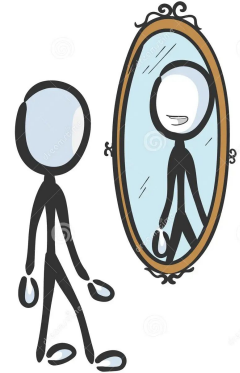
Strict deadlines

Flexible resources



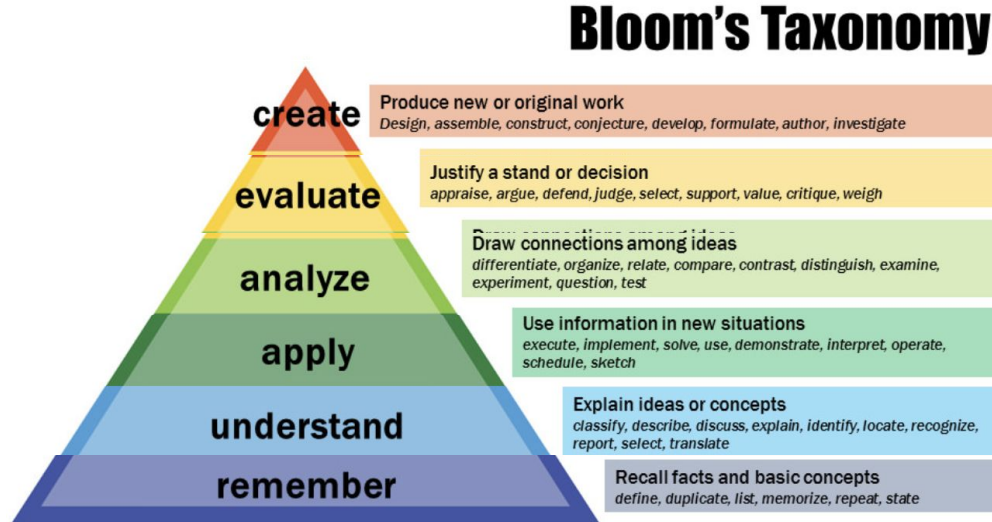
Collaboration

Self Reflections



Background: Effective teaching and Blooms Taxonomy

- Provide learning that engages the student and enables future **creations**



<https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/>

Background: Effective teaching concepts

- Provide learning that engages the student and enables future **creations**
- Challenging and Creative Assignments
- Grading Interviews
- Peer to Peer interactions
 - Discussions
 - Grading
 - Projects
- Self Reflections
- Constructive and targeted Feedback



Background: Ungrading framework

- Focus less on exact grade and more on, is this “good enough”



Novice



Approaching

Not Good
Enough



Proficient

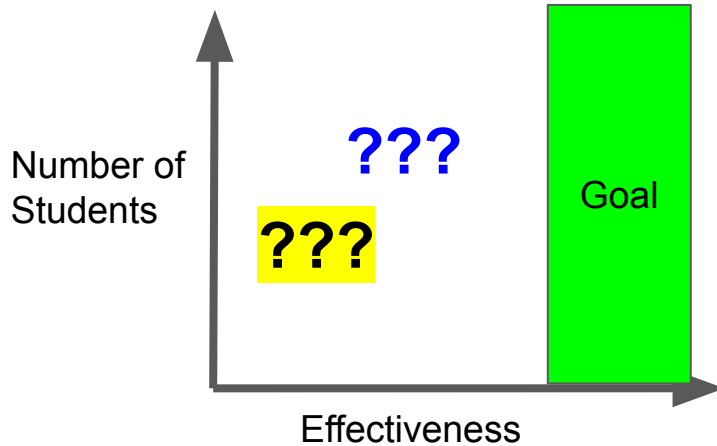


Advanced
Understanding

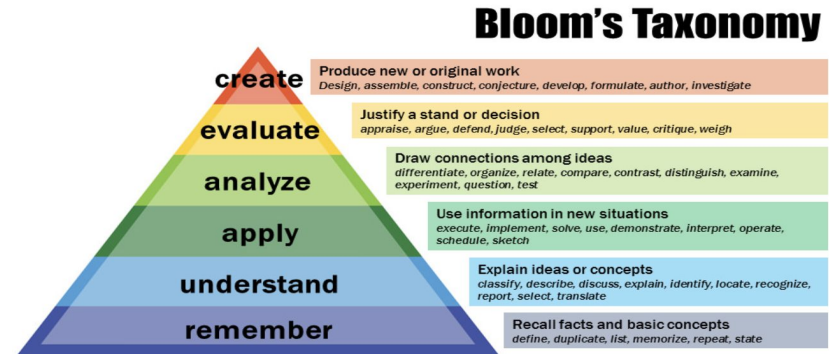
Background: Look to our peers

- International: Exams are all you need (grades to a GPA scale)
- Locally
 - Maybe participation credit
 - Homework Assignments
 - Quizzes
 - Exams
 - Typically scored 0 - 100
 - Focus on a number score and not feedback

Background: Plot Effectiveness wrt Bloom's Taxonomy



- Principles of Programming Languages, lovingly called “PPL” has two versions
- **Version 1:** Project Based
- **Version 2:** Lecture Based



<https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/>

Background: Version 1: Project Based

- Participation: is considered in course grade
 - Includes quizzes that are **peer graded**
 - Labs: **Analyze** topics of interest
 - are the basis of student learning, **performed in teams**, autograded
 - Interviews: **Evaluate** their past performance
 - Facilitated by course staff
 - Shrunk length over time
 - 2 Exams: **Create** original solutions
-
- **Very effective, struggles to scale to larger class sizes**

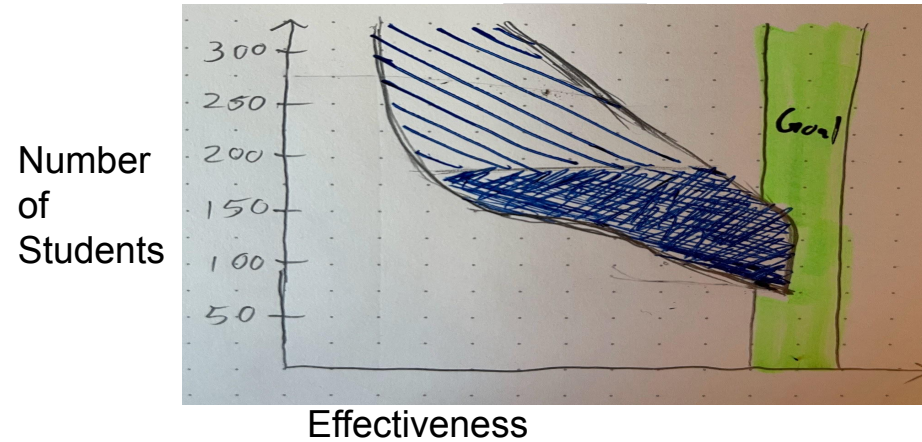
Background: Version 2: Lecture Based

- Lectures: Remember, Understand and Apply ideas
 - are the basis of student learning and are not graded
 - Assignments: Apply mostly isolated topics with
 - Autograded
 - Limited informative feedback
 - Mini Projects: Analyze multiple topics in connection to each other, autograded
 - 6 Exams: Understand, Apply and Analyze concepts across the term
-
- Questionable efficacy, but “fair” and consistent scale of learning

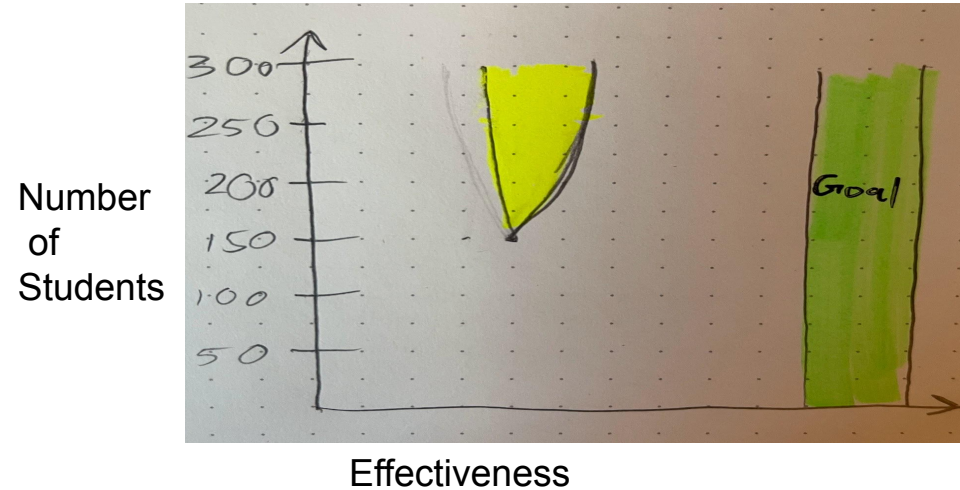
Disclaimer:

The following is a **rough** sketch

Plotting the Courses and Comparison



Version 1: Project Based



Version 2: Lecture Based

The Courses are good enough, but can we do better?

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Let's talk about Interviews

Challenge: Current interview grading

Current interview grading

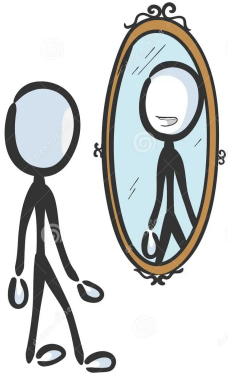
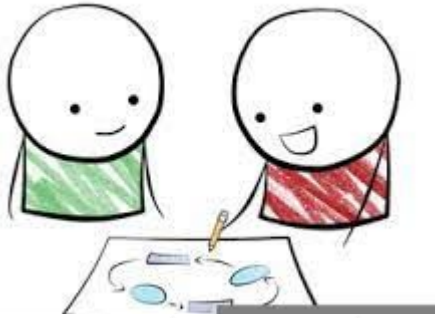
- Cost to full staff: ~40 hours each cycle
- Cost to single students: 15 minutes
- Value: students have a grade

Proposal: ???

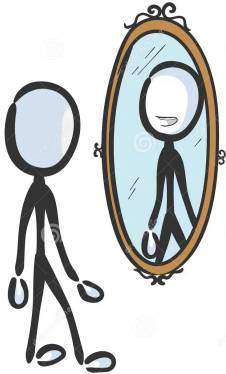
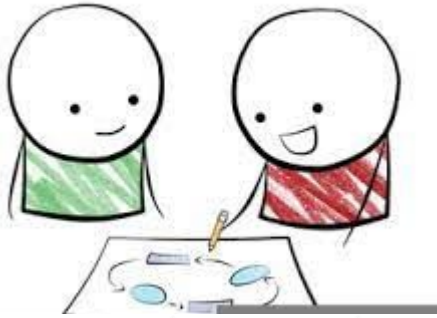
Proposal: Student Collaboration



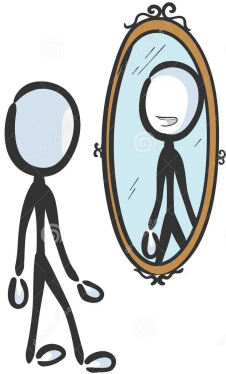
Proposal: Students collaboration and self reflecting



Proposal: Reflective Peer Interviews



Proposal: Reflective Peer Interview Un-Grading



Proposal: If done right:

Current interview grading

- Cost to full staff: ~40 hours each cycle
- Cost to single students: 15 minutes
- Value: students have a grade

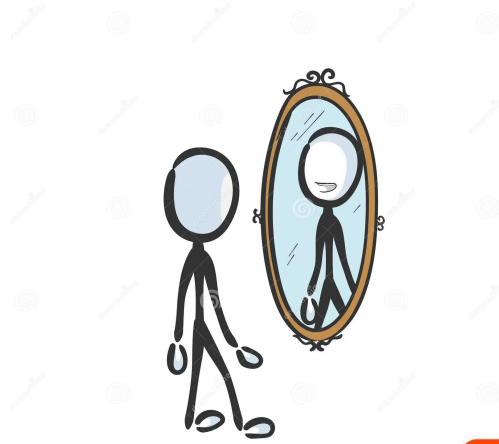
Proposed interview grading

- Cost to full staff: ~40 hours each cycle
 - Emphasis on Feedback
- Cost to single students: **1 hour**
- Value: students have a personal sense of ability and feedback to assist in deeper learning

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Implementation: 4 Phased Interview



dreamstime.com

ID 190929240 © Viktor



Implementation: 4 Phased Interview: **Training Phase**



Implementation: 4 Phased Interview: Interview Phase

- Preparation: student teams discuss the lab
- Recording: student teams record the interview together
- Submission: student teams submit one video recording

Students collaborate and pair in **analyzing** and **evaluating** their own learning

Implementation: 4 Phased Interview: Reflection Phase

Students **evaluate** their learning and grow soft skills through hard discussions



Implementation: 4 Phased Interview: **Feedback Phase**

- Review of submission: Course staff reviews submissions for a final grade
- Feedback: Course staff prioritizes targeted feedback for the students
- Interventions: Course staff works with students to better evaluate their own work



Implementation: 4 Phased Interview

Review

- Training Phase
- Interview Phase: preparation, recording, submission
- Reflection Phase: self reflection, conference, write-up, submission
- Feedback Phase: review of submission, feedback, interventions



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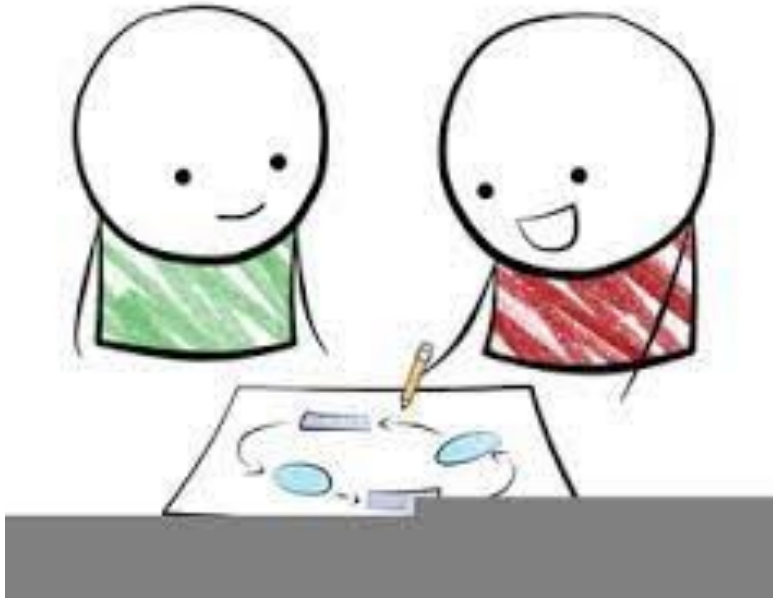
Experiment: Interview of Current Staff

- What do you see as potentially valuable in this concept?
- What concerns do you have about this concept?
- How would it match your course?

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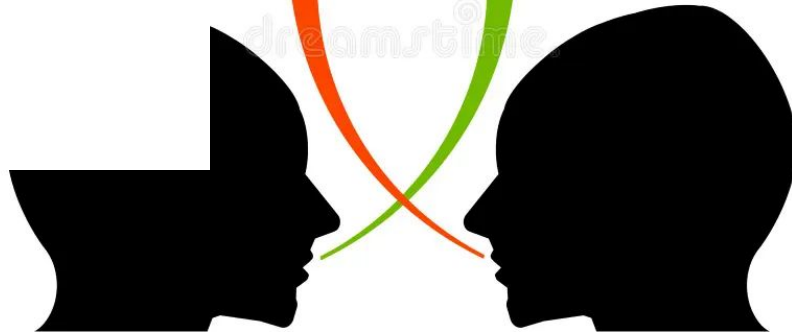
Results: Value for Students



Results: Value for Staff



ED BACK



Results: Concerns

- Student Ethics?
- Student Time?
- Student Pairs and Respect?
- Student training?
- TA training?

Disclaimer:
Pretend it's actually 2025

Overview

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- Proposal: Reflective Peer Interview Un-grading
- Implementation: 4 Phased Interview
- **FAKE: Experiment: course execution**
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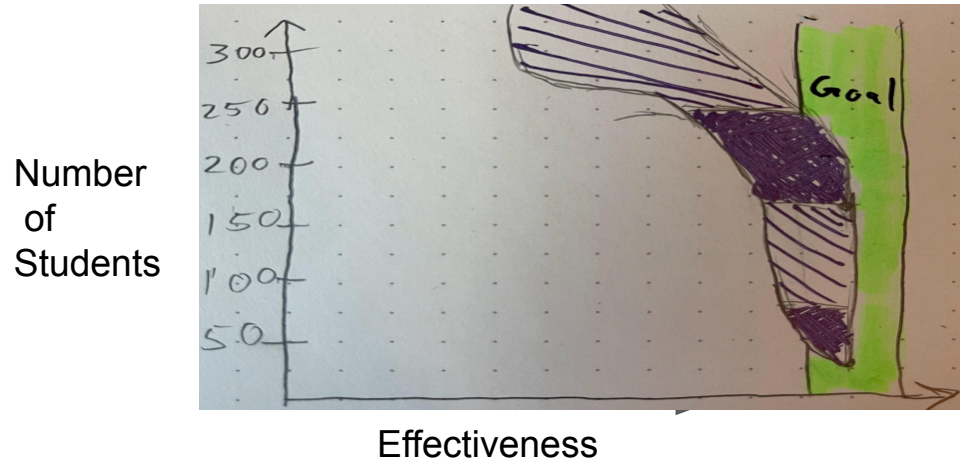
FAKE Experiment: Course Development

- Experiment Pilot Summer 2024 (< 40 students)
 - Small class size
 - Flexible resource constructions
 - Leveraging **Version 2** (Lecture based) content for additional **Version 1** (project based) practice
 - Full Ungrading Model: Reflection, Standards or Contracts
 - Peer Interviews Rubric Construction and Resource Linking
 - Lab Refinement
- Control Fall 2024 (~ 200 students)
- Experiment Spring 2025 (~ 200 students)

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- **FAKE: Results: Plotting Effectiveness**
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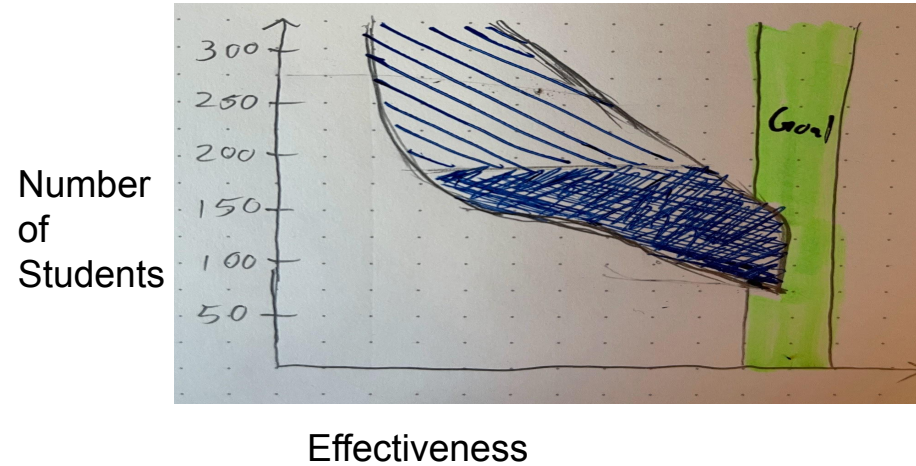
FAKE: Results: the course on the matrix



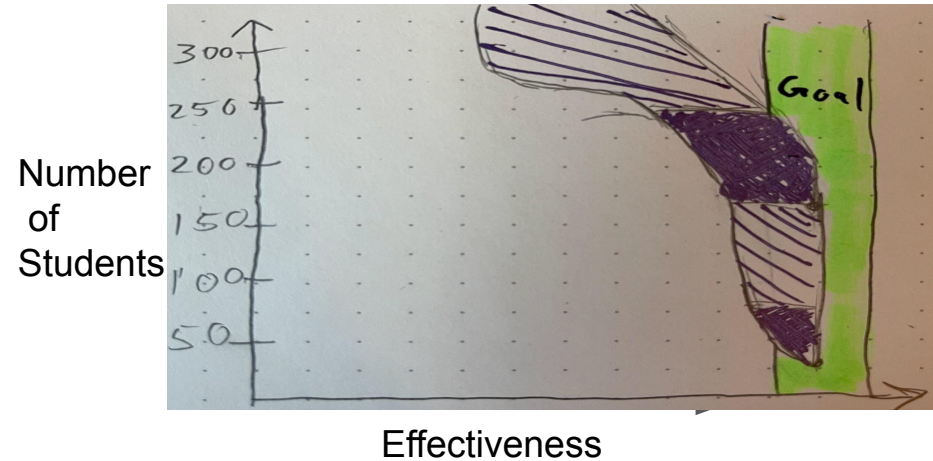
Version 3: Project based with reflective peer interview un-grading

More students make it to the goal state

FAKE: Results: the course on the matrix



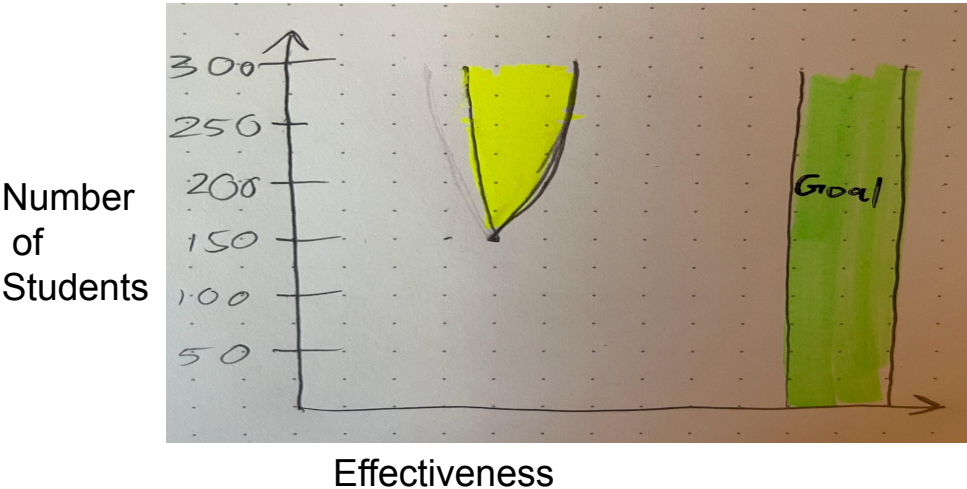
Version 1: Project Based



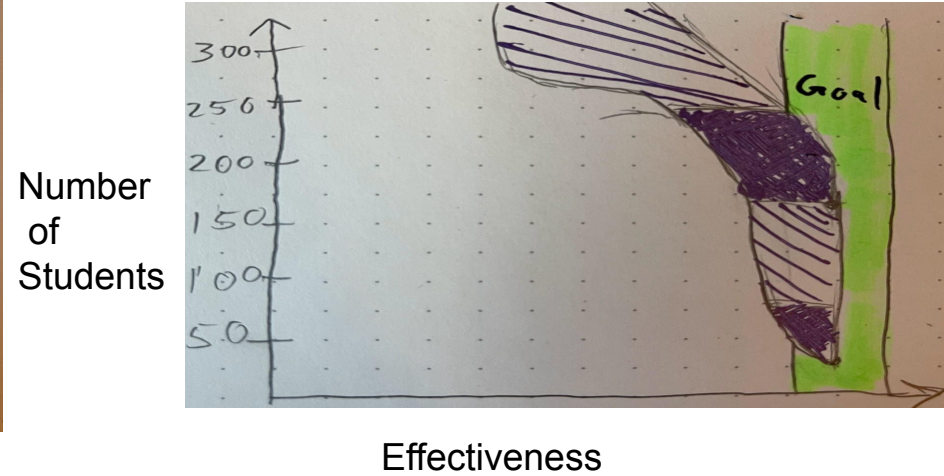
Version 3: Project based with reflective peer interview un-grading

Still not consistent in growth, but more time in the goal state

FAKE: Results: the course on the matrix







Version 2: Lecture Based



Version 3: Project based with reflective peer interview un-grading

Consistently more effective than version 2

FAKE: Results: additional elements

Topic	Term 1 (0 - 10)	Term 2 (0 - 10)	
Student Confidence	2	7	
Student Performance	4	6	
Staff Availability	3	5	
Staff Emotional State	1	8	

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Future work

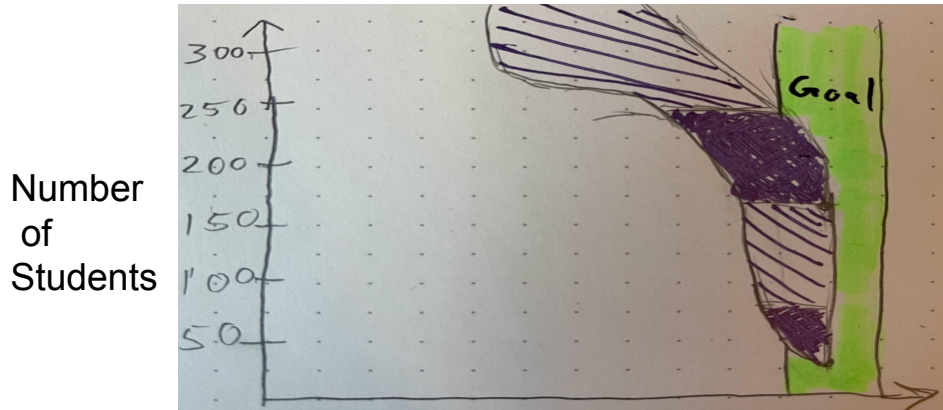
- Expert Sampling Feedback Review
 - More time for feedback
- Informed Team Pairings
- Ethical Guardrails
 - Complete during lecture time?

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Summary

- Higher enrollment means changes in cc



Effectiveness

Version 3: Project based with reflective peer interview un-grading



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Questions?

Supplemental: Reflective Ungrading

- Emphasis on an X / Check+ system
- Students have flexible assignments
- Students complete their work and grade it themselves
- Students have interim term self reflections of their total course standing
 - Students get 1:1 time with course staff
 - Recommended: instructor only review
 - Question: can a student staff DRI be an intermediary for this at scale while staff is instructor is still the core person responsible for hard discussions?

Supplemental: Contract Grading

- Define what students need to complete “good enough” to get a B
- Define what additional tasks can be completed “good enough” or exceptionally to get an A
 - Extra assignments
 - Extra features on assignments
- Define what happens when the contract is not met, how to fall to C, D or even F

Supplemental: Standards Based Grading

- Define standards as topics or bundles of topics
- Grade by standards within each assignments
- Students must demonstrate success on some percentage of all standards
 - E.g. 95% standards is an A
 - E.g. 75% standards is a B
 - E.g. all students must pass the “functional list” standard
- Opportunities to re-attempt standards throughout the semester
 - 4 tries
 - Only need 2 to show mastery of the standar
- Need to pass some

Presentation feedback and questions

What is the metric for “effectiveness”

- I think this could be the ability of the “average” student to perform the task level from bloom's taxonomy
- I think this should be the y axis
- I suppose this will then make the goal state a complete graph - assuming that they need to remember before they can create

Grading internationally

- At an institution in Germany it was common that on an exam, after the exam is graded, a rubric is released. Students can review the rubric against their solutions. If they believe their solution was correct but graded incorrectly, they can come to the prof' with some pre-formed argument to discuss the merit of their solution
- This is interesting to the crowd to give students the ability to receive additional credit by taking ownership
- Reminds of options for students to even make corrections. The students go and fix their mistakes and writeup an explanation of why their solution was not correct. Places emphasis on student learning rather than exam performance

Does this need to be graded at all

- Consider that the course already has assessment of mastery in the material. The interview could become random assessment of ability to host a good conversation on the content. How the interview is performed not how correct the student is....
- We could then prioritize feedback to students that self identify low performance
- This also helps to alleviate my concerns on ethical guardrails. Students incentive to cheat is removed. I think this pivots that challenge to getting students to buy into the value of this process and to take it seriously without the same kind of grading mechanism attached to it.

Driving factor of student interests

- Money isn't the only factor
- It may have been the inspiration, but more correctly students want the skills to perform well in the job
- As some say, anyone can be a T4... but to be a T5+ takes exceptionalism

Tell a story

- Interacting with the audience with Christian as an example helped
- In the next iteration, I think its best to tell two stories
 - 1. The isolated student interview process and that place in the matrix
 - 2. The peer interview process in context of the full course and that place in the matrix

Decentralized Education

“You've also got me thinking about decentralized education mechanisms. The historic institutionalized education model that we have assumes an expert who has the "correct" knowledge and whose duty it is to impart that knowledge into the minds of others. It is a socially stratified model of education. What would education look like when people are free to choose what knowledge they want to acquire and refine? What assessment and feedback methods would facilitate this?” - Ben

Are deadlines consistent and scalable

“Deadlines may not be a good way to provide consistent learning opportunities, as students might perceive them differently, some students may require more time and more effort to understand topics than others” - BS

Bias

- There is bias in the students peer grading eachother
 - Still relevant in the restructure.
 - Students may now just want to make their peers feel good and inflate grades
 - How do we help students understand the intention that they want to be honest and fair in personal and peer assessment so that the staff can provide effective and directed feedback to the students.
- There is bias in the staff regarding the work
 - Less relevant with restructure