Teaching Training and Experience

I was selected for the competitive Bass Instructor of Record Fellowship for the 2023-24 academic year at Duke University. As such, I have developed curriculum for and served as the only instructor-of-record of a 15-week required discrete mathematics course (138 students, 25 course staff members). I later received Duke's Dean's Award of Excellence in Teaching based on my teaching in this course. Table 1 summarizes the descriptive statistics from the teaching evaluation for this course.

Table 1: Teaching evaluation descriptive statistics contextualized by departmental norms

Measurement	Discrete Math (Spring 24)			All Duke CS courses (Spring 24)		
	Mean	STD	Median	Mean	STD	Median
Students' overall rating of instructor	4.53	0.84	5	3.60	1.22	4
Students' overall rating of the course	4.24	0.99	4.5	3.76	1.04	4
Students' level of engagement with the course	4.11	0.79	4	3.61	1.00	4
The course's level of intellectual stimulation	4.36	0.75	4	3.90	1.00	4
The course's level of difficulty	3.82	0.96	4	3.50	1.12	4

During my time at Duke University and National Taiwan University, I have served as graduate teaching assistant (13 courses in total), instructed weekly discussion sections (9 sections across 5 courses, 12–30 students each), and guest lectured (13 occasions) for discrete mathematics, algorithms, data science, and learning science/AI literacy courses. I have regularly taken leadership roles in large teaching teams (10–40 course staff members serving 120–336 students, 7 occasions in total), where my responsibilities included (1) course material development, (2) autograding system maintenance, (3) staff training and management, (4) oversight of grading, and (5) oversight of help ecosystems. More information and links can be found on my website.

I have completed the Certificate in College Teaching program at Duke University, where the pedagogical training included coursework on curriculum design, teaching diverse learners, and topics in higher education, as well as peer teaching observation programs across different disciplines.

Teaching Philosophy

I believe that all choices I make in my teaching **designs** collectively shape the learning environment I curate for my students, and are far more consequential to my students' learning and development than my performances in synchronous class time. *In my teaching designs, I care the most about:*

A flexible learning environment for everyone to succeed, not just "the typical student". I once believed that I needed to "calibrate to the typical student" as an instructor. Now, I believe in designing the learning environment for every student, including neurodivergent students, students from marginalized backgrounds, and *all students who are unlike the typical student*. As students in today's large-scale computing classes come in with diverse academic backgrounds, cultural backgrounds, interests, goals, needs, and expectations, the "typical student" may not even exist. Instead of hoping to find one learning design that serves all well, I set my goals in crafting a learning environment that is *as flexible as possible for every student to succeed in their own way*.

My discrete math class adopted a partially flipped model for equity. My students, whose prior exposure to college-level mathematics drastically varied, were given as much time and space as necessary to (re-)familiarize themselves with the basic concepts asynchronously before class meetings, through designated readings and corresponding proficiency quizzes automated in the learning management system (LMS) that they could attempt for an unlimited number of times. This "levelled the playing field" and helped prepare students for more challenging active learning activities in the synchronous class meetings. I also built flexibility in *content* despite the course being required: in addition to core modules, which were required for all students, my students selected from a set of elective modules the ones that most aligned with their academic interests. As a result, multiple students indicated in their feedback (see evaluations) that my teaching designs set them up for success which would otherwise not happen in a conventional course. But what does success mean?

I define "success" in my course by:

Grades that measure mastery and only mastery. As an instructor, I would like the grades that I give my students to, accurately and unbiasedly, reflect *how much mastery* (on course topics) *they* *have demonstrated at the end of the academic term*. However, conventionally points-based grading systems typically reward not only mastery but also time management, fast thinking and writing under stress, argumentative skills (through grade grubbing), or even activities completely outside the scope of the course such as participating in a research study. While these dynamics are usually designed with goodwill, they can sometimes create a false impression that learning is fungible (as points are), shift students' focus away from mastery, or promote inequitable competition [1, 2].

Borrowing many design ideas from the *A's for all* [3], *equitable grading* [1], and *specification grading* [4] initiatives, my discrete math course abandoned the use of points, basing students' final grade solely on (1) the number of modules that they successfully complete, and (2) their performances in summative exams. Students had the entire semester to complete any module, with all assignments enabling revisions upon getting initial feedback from the course staff; the summative exams all came with retake opportunities at the end of the semester.

The course also stayed away from using any normative *"curving"* grading policies, as the syllabus clearly stated to students *"Your success does not come at the expense of others' success, and vice versa."* With careful management of human resources in a highly structured course staff (25 TAs, two weekly staff training sessions that I ran myself), my students reported that they focused more on their own mastery of the content, felt they were given more valuable feedback on their work, but spent roughly equal amounts of time compared to in a conventional class [6]. In my future teaching, I am dedicated to continuing these practices, while also improving on two pain points reported by students [6]: (1) more effective initial communication of the grading designs to students, and (2) incorporating mastery-grading-oriented tools that support easier progress tracking for my students.

My students need to track their learning progress because I:

Let students own their learning. We as instructors have limited time and energy. Every bit of our time and energy spent on micromanaging our students prevents us from engaging with other valuable innovations in content or policy design. Instead of trying to mold every student into the ideal learner I subjectively picture, I choose to respect that every one of them comes into my course with their own goal and purpose, and some will naturally be more engaged and behave more conscientiously than others. I want to craft a learning environment that rewards motivated and self-regulated learners (naturally by seeing progress in their own learning) but does not penalize others with unnecessary regulations. When it comes to academic misconduct, I try to eliminate the incentives for it through scalable policy design (e.g., eliminating competition) rather than through non-scalable monitoring of every potential instance.

In my discrete math course, students made learning decisions for themselves, such as whether to pair up in completing assignments for each module, or whether to attend a small-scale discussion session or complete the work separately otherwise. With minimum micromanaging imposed, my students reported being able to more easily juggle the class workload with their other commitments and expressed feeling trusted as learners (see the experience report [6]).

Connecting pedagogical research with teaching. Besides my values and beliefs as a teacher, I am also a computing education researcher who strives for transferring practical insights from the frontiers of pedagogical research into my own teaching. Specifically, my own research focuses on computing students' academic help-seeking behavior, which broadly entails understanding when, how, where, and why computing students seek help on their coursework. As such, I put extra emphasis in my own course's help ecosystem design and monitoring; this effort was recognized by students (see evaluations). Outside of my own research, I regularly use evidence-backed teaching strategies and tools such as peer instructions [7] and Proof Blocks [5] in my teaching.

References

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[3] Dan Garcia, Armando Fox, Solomon Russell, Edwin Ambrosio, Neal Terrell, Mariana Silva, Matthew West, Craig B. Zilles, and Fuzail Shakir. A's for all (as time and interest allow). In *ACM SIGCSE TS*, pages 1042–1048, 2023.

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[7] Trisha Vickrey, Kaitlyn Rosploch, Reihaneh Rahmanian, Matthew Pilarz, and Marilyne Stains. Research based implementation of peer instruction: A literature review. *CBE—Life Sciences Education*, 14(1):es3, 2015.