# Michael T. Gastner

▬▬▬ Teaching Philosophy

In a famous joke, a tourist in New York City sees a musician with a violin case on the street and asks: "Can you tell me how to get to Carnegie Hall?" Without a pause, the musician replies: "Practice, practice, practice."

I often share this phrase with students, relating it to their own educational journey. For an outsider, a venue like Carnegie Hall might be a mere location, but for performers, it represents a milestone achieved after years of dedicated effort. Similarly, I firmly believe that learning is optimized through active engagement, continuous preparation, and constructive feedback. Additionally, the path to mastery demands steadfast commitment because not every attempt yields immediate success. By embracing challenges and learning from mistakes, students can gradually build confidence and proficiency. My aspiration is to empower students to reach their full potential, and my role is to coach and mentor, designing structured and effective training programs.

Hands-on activities are the most effective means of acquiring new skills, just as playing an instrument is the most direct way to improve as a musician. Traditional lecture-style teaching often falls short of actively engaging students. Therefore, I employ the **flipped-classroom pedagogy,** requiring students to complete preparatory assignments before each lesson to enable active problem-solving during class. For instance, for the "Quantitative Reasoning" course I previously taught at Yale-NUS College, I developed customized video tutorials on my YouTube Channel that teach the programming language R. As one student noted in a course evaluation, "I really appreciated the tutorial videos; they were helpful because I could see exactly how the R code worked."

While only a select few violinists perform solo at Carnegie Hall, the majority collaborate with accompanists or orchestras. Musicians must rehearse as an ensemble to pinpoint areas that require individual practice. Similarly, I apply the **team-based learning** technique in my courses, forming small teams of students who collaborate on in-class activities throughout the semester. For each exercise, teams are responsible for a joint solution, which is then reviewed by other teams. This process of giving and receiving feedback through peer review nurtures essential professional skills, such as communication and critical self-reflection, while ensuring that diverse perspectives and skills are valued. By helping students identify their strengths and weaknesses as team members, I aim to cultivate the next generation of informed, responsible leaders.

Over the course of my career, I have had the opportunity to teach in a wide range of settings, from small liberal arts classrooms to large online lectures at research universities. Each environment presents unique challenges and requires a customized approach to meet students' needs effectively. Yet, certain principles remain constant: active learning and student engagement are critical to deep understanding, regardless of class format. Research, such as the study by Deslauriers et al. (2011), has demonstrated that, even in large-enrollment courses, small-group activities and technology-based tools (e.g., online quizzes) can stimulate meaningful interaction and engagement in lecture halls. By implementing these strategies and providing timely feedback, I strive to create an inclusive, dynamic learning environment where students feel empowered to participate actively in their education.

Course Evaluations for Data Visualization
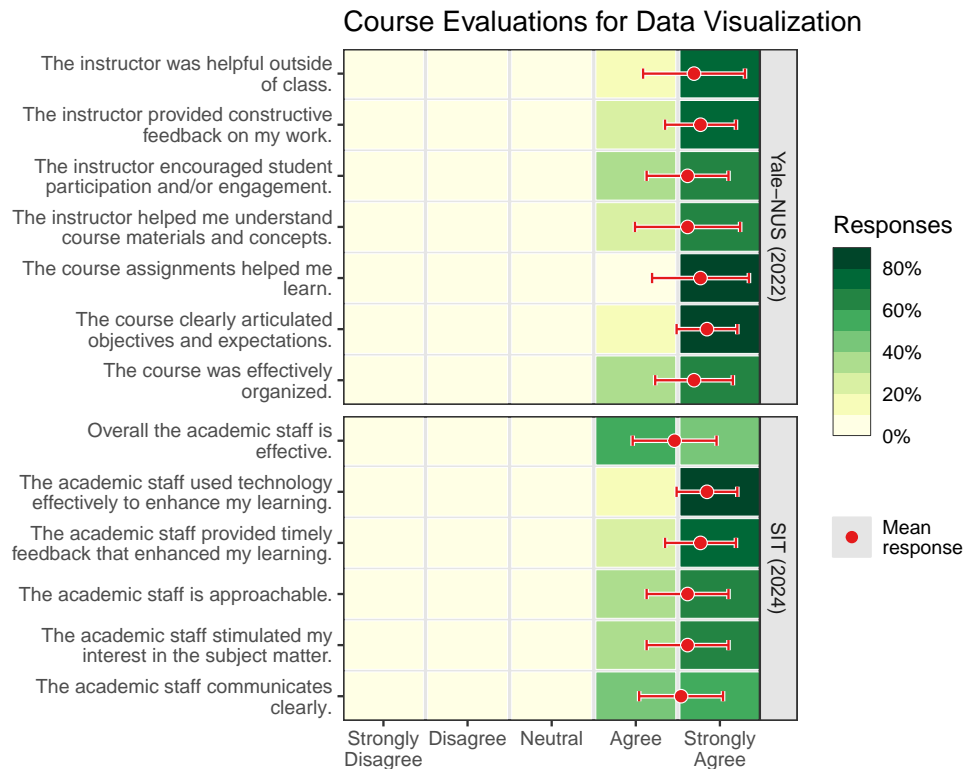
Figure 1: Quantitative metrics of my teaching evaluations at Yale-NUS College and the Singapore Institute of Technology (SIT). Error bars indicate ± 1 standard deviation from the mean response.

Evidence of Teaching Excellence

My teaching style consistently receives positive feedback from students. Figure 1 shows that most students agreed or strongly agreed with my teaching style at two different institutions—Yale-NUS College and the Singapore Institute of Technology (SIT). The mean rating of my visualization courses, averaged over both institutions and all course evaluation statements, is 4.6 out of 5. Here are representative quotes from students:

○ Yale-NUS: *"This course was simply one of the best, if not the best courses I've ever taken (in university, and otherwise)! Almost everything was perfectly planned, to the extent where the course feels like it was bespokely hand-crafted by a meticulous genius, borderline over-engineered if you will (in a really good way). There was a clear learning outcome and narrative for every assignment, and every moment spent on the various course activities (like peer reviewing, group-work, assignments, readings) was completely justified."*

○ SIT: *"Unique way of teaching and assessment, but I find it to be more effective and my knowledge retention and skills acquired is higher compared to the more conventional methods used by the other professors."*

Following supportive reviews by domain experts, CRC Press recently offered me a contract to publish my teaching material as a textbook, tentatively titled "Mastering Data Visualization Using R, Quarto, and the Tidyverse," scheduled for completion in 2025. Parts of the draft are already available at https://data-vis-using-r.info/. Additionally, I would be pleased to share further evidence of teaching excellence, including peer observations and course evaluations, upon request.

Reference

Deslauriers, Louis, Ellen Schelew, and Carl Wieman (2011). "Improved Learning in a Large-Enrollment Physics Class". In: *Science* 332.6031, pp. 862–864. DOI: 10.1126/science.1201783.

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