



# INNOVATION ABSTRACTS

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## THE BENEFITS OF CROSSING DISCIPLINES: WRITING + CALCULUS = A HAPPY MARRIAGE

I recently taught a section of first-semester calculus for the Honors Program at Moraine Valley Community College. The Honors Program has specific goals that make the experience unique. One of the more challenging goals is to serve the community and help others by way of team-building and collaboration. I brainstormed about how my students could meet this goal, and I eventually decided to have each student choose a topic/concept/theorem from the semester and write about it. I was not aiming for a technical narrative or a how-to manual from the students. At the core, I wanted them to deliver an informal account of a topic, something explained in their own words. By semester's end, we would have a small manual of "casual calculus" to share with incoming calculus students. We decided to call our project *Cocktail Party Calculus: A Reference for Students by Students*.

About mid-semester or so, rough drafts with catchy titles began appearing in my inbox—"The Intermediate Value Theorem," "u-substitution: It's all about u," "On the Relationship between Integration and Differentiation." My role as "editor" was to patch up grammar and check the mathematics. Some narratives were stellar while others needed a bit of work here and there. After reading them, I shared the revised narrative with the author(s) for final approval. If all was well, the revision became a chapter in the *Cocktail Party*. In all, the book has 13 chapters—some with a single author, some with dual authorship, and one with three authors. For variety, I also asked a former student to sketch some comic strips related to calculus themes. All classmates agreed that spiking a calculus book with humor couldn't hurt.

Several things struck me from the day I introduced the project to when *Cocktail Party* became a reality. First, there was a sense of increasing camaraderie

as the semester progressed. Everyone in the class embraced the team-oriented goal of producing something readable and interesting for an audience who might feel indifferent to the content. Throughout the semester, there were episodes of interdependent coaching among peers in the class; I observed several accounts of unsolicited help from peer to peer with an eye on making *Cocktail Party* the best it could be. This is somewhat unusual in mathematics classes which frequently rely on competitive models rather than cooperative ones. On the flip side, there was an interesting but amicable rivalry between students (e.g., my chapter is the best in the book, people will laugh and cry when they read my chapter). This cooperative-competitive tension resulted in a balance I have never previously achieved in the classroom. By the end of the term, nearly half of the students told me this was the first time they felt their personal efforts contribute collectively to a meaningful project. Strange as it seems, I did not *teach* my students to behave as such. Rather, it was evoked by the expectations of the project.

Second, I was offered a unique experience with the students simply because I asked them to express their ideas in writing. What I assumed was merely a roomful of mathematically competent individuals turned out to be far more—creative thinkers, fluent and persuasive writers, and some who might consider entering the stand-up comic enterprise! As a math teacher, I frequently see one-dimensional profiles of my students (e.g., Sue is a good math student). *Cocktail Party* allowed me to assess the students in a novel way while encouraging expression of ideas in a different medium. There is a heightened sense of responsibility when a student understands that the quality and clarity of his/her work will influence the extent to which others may come to understand the concept. When expressing one's ideas in writing, a certain level of proficiency must be reached, and words must be chosen with great care.

Third, I was struck by the questions I was asked throughout the writing process . . . *Do I need an attention grabber to start my chapter? How should I organize my chapter? Should I include examples? If so, how many? Do I need to be consistent with the other chapters? What exactly do*



*you want from me?* At some point during this process, the project became far more about writing and far less about mathematics. In short, I offered very little guidance. My common response was, "The chapter should be whatever you want it to be." This I thought would make each contribution unique yet keep the (eventual) reader engaged from chapter to chapter. The end result: Almost everyone's chapter is a true original, yet the chapters hum together like a well-oiled machine.

Fourth, several students appreciated the formal tutelage of the editor/contributor professional experience. As the "authors" submitted their drafts to me, I carefully combed through the contents considering everything—grammar, cohesiveness, mathematical accuracy, and relevance. I made changes/suggestions as I saw fit but without "robbing" the originality from the initial draft. After the revisions, I formatted the document to look like a book chapter and asked that the authors carefully review the document. If necessary, we made additional changes until all parties were satisfied. One student told me, "I really feel like I'm contributing to a great product. This process has helped me understand the mathematics and all the hard work that goes under the radar in seeing a rough draft progress to final copy." It is rare for students to experience projects of this nature—perhaps in a senior-level composition class, but certainly not in mathematics!

Last, there were many times when we shared laughs about the project. For example, in constructing the book's table of contents, we thought it only fitting that we adhere to the customs of real cocktail parties. What goes on at cocktail parties? Are there different party phases? As a class, we decided on three parts of the book: opening remarks and introductions (hors d'oeuvres and savory snacks), main content (fine conversation and signature cocktails), and some knot-tying chapters (cigars). All contributors submitted a photo along with some biographical information (transfer school of choice, major of study, and two hobbies). Hobbies included jamming to Ludwig van Beethoven, consuming triple-patty hamburgers, and brief walks on the beach. Clearly, this project brought the fun back into the learning experience. There were times when *Cocktail Party* felt less like work and more like the engaging and rewarding experience it truly was, for both student and teacher. All of this and our focus never wavered from the selfless intention that the book should assist others in their journey of learning calculus.

So what to take from this? I believe incoming Calculus students will find *Cocktail Party* helpful and humorous to their calculus experience. We have made the book publicly available on our departmental webpage ([www.morainevalley.edu/math](http://www.morainevalley.edu/math)) for anyone interested in its

contents. As the proud facilitator of this project, I am delighted with the finished product but even more impressed with the dedication and hard work that drove this project to its finished state. While most people are aware of mathematics and its relevance to scientific domains, we mutually discovered equally important connections to the humanities and the arts. It was a joy to see students from all walks of life—aspiring engineers, dentists, math/science teachers, pharmacists, accountants, and business entrepreneurs—contribute to a project that blends mathematics, creative writing, and artistic growth. Calculus is too often pigeonholed as a "survival course"—one that is both demanding and unforgiving. These students, while they found the experience demanding, found great satisfaction in the collaborative effort. Best of all, the fruits of their efforts will serve incoming students for semesters to come.

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