

Enhancing mathematics teaching and learning: What students have taught us

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The Writing Course

Developed and team-taught with J.P. McKenna since Fall 2005.

Fulfills university's writing requirement.

19 students from different sections of Multivariable calculus courses (taken concurrently).

Weekly essays primarily about their teaching and learning experience in the calculus course.

Instructor's name is not revealed.

Cardetti or McKenna not teaching any of the calculus sections.

Final Report: revised essays, a prologue, and an epilogue.

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The study

- Analysis of four years of final reports → *cycle*
- In-depth analysis → clear separation of cycle into 4 periods.

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Relevance

- **Students' responsibilities**
- Instructor's responsibility and expectations

How to raise "Audience Rating"?

Soloist scenario

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Findings and Results

Four distinct periods

- Academic Life Cycle
1. Settling in
 2. Getting down to business
 3. Mid-semester "rut"
 4. End-of-semester frenzy.

1. Settling in

First day nervousness

"As a math-stat major I was excited to begin multivariable calculus for the first time. However when I finally got to the class through the frigid wind, I was struck cold again but by the atmosphere. It was one of those first days where no one knows each other. We were all uncomfortably waiting for the professor to arrive to break the silence."

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On the Syllabus

"The professor rumbled through the syllabus explaining the difficulty of the class, as well as the great amount of work required. As always, I was overwhelmed by all the information I was receiving... I always hate the first day of classes because I get anxious... it was also clear that the instructor was not enthusiastic and was bored by the tedious first day overview. Sure enough the second day of class there was a completely different instructor in the room."

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About graded work

"My professor doesn't collect and grade homework that he assigns. Last week I took advantage of this and didn't do all that was assigned. I would prefer if the homework were graded. This would ensure that I not only do the work, but that I also do it completely and really try to learn the material."

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Settling in Practical Implications

- It does help to smile.
- Do not spend too much of the first class on the overview of the course (syllabus).
- Do some mathematics on the first day.
- Provide early feedback: graded homework or quizzes.

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2. Getting down to business

First exam → evident change in mood and focus

“Taking an exam is not merely an event that lasts an hour or so, but a process that begins from the moment you learn the date of an exam until you hand in your test. I believe there are three steps to preparing for any exam: denial [date is given], ambition [preparation days], and apathy [ready for exam]. ”

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During the Exam

“When I turned to the first page it was the true and false section. I didn’t expect any true or false to be on the exam, it caught me by total surprise! Besides that, the test was short, only six or seven questions. I can see how these things can throw people off or make them nervous, but I wasn’t about to let it affect me. ”

The aftermath

"When I receive my exam, I tend to look over it only to the extent that the professor goes over it. I really should change that. Professors give back the exams so we can see the errors we made and fix them for the future. "

Getting down to business Practical Implications

- Clearly communicate the expectations for an exam.
- Go over the exam to give them the opportunity to reflect on their own successes and failures.

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3. Mid-semester "rut"

Slow interaction, students clearly fatigued

"I think at the beginning of the semester I was more ambitious, and I definitely had more will power. Maybe, I'm just worn down from eight weeks of school, but I get into a lazy mood and do practically nothing for days, and I think of the beginning of the semester when I was so ambitious and I wonder what happened. I need my enthusiasm back and my concentration in order to succeed completely in the goal I set for myself back in January. "

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Scale back of expectations for struggling students

"It is now midway through [the course] and I would like to switch majors. I'm doing decently in [the course], but I don't think I will be able to reach my goal of getting an A this semester. "

"I still think highly of my professor's teaching methods and he manages to keep me engaged and on topic at 9:30 in the morning which is a lot to ask. As to my performance, I was satisfied, but not overjoyed with it on the first test.... I'll have to work pretty hard to finish out this semester at the level I hope to achieve, but if I focus hard enough, I may live up to my expectations."

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4. *End-of-term frenzy*

Weeks leading into finals

"With finals week looming closer and closer, everyone is in a frenzy getting work done for the last two weeks of classes as well as preparing for the final exams. These next two weeks are going to be challenging for me... "

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The Good and the Bad of finals

"...finals week is the hardest week in which to focus, especially during the spring, since the weather is getting warmer and the clothing is in short supply..."

"My strong start should carry me through Wednesday, at which point I will be mentally and physically exhausted. After my exam on Wednesday I will have to muster up one last surge to maintain momentum through Wednesday and Thursday to prepare for my last final."

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End-of-term frenzy Practical Implications

- Avoid cramming last-minute material into the final classes.
- Focus should be on understanding of the key topics rather than surprise “trick” questions.
- Clearly communicate the expectations for the final exam.
- Provide some guidance for students to plan and think about their study strategies for the week of finals.

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Instructor's Responsibility

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