

Teaching Philosophy of Michael J. Fairchild

Instruction

In teaching a mathematics course, it is all too easy to simply pepper the students with a jumbling array of disconnected facts and formulas. In order to impart the students with a sense of purpose and achievement, I deliberately arrange the sequence of topics to build towards a substantial goal, a denouement that demonstrates the power and usefulness of the subject to the students. Along the way, I strive for originality of presentation, emphasize the abstract approach, allude to history, assign challenging problems, and seek out and remedy deficiencies in student comprehension. I will address each of these points in turn.

Originality in lecture and exam materials is important for both the instructor and the student. The book and lecture notes should supplement, rather than duplicate, each other. Preparing lecture notes in a novel way forces me to consider the material afresh, which often leads to new insights and teaching perspectives, and creating original exam questions each semester compels the students to come to grips with the material before the exam. Memorizing problems from past exams and simply changing numbers around will not be a successful strategy for the student; rather they must develop a mastery of the material and understand how to apply it in new situations, which is the real test of comprehension.

Above all, I emphasize the power of the abstract or theoretical approach; that in solving a mathematical problem *once*, the student is in fact solving innumerable different physical problems -- the difference between them being merely one of interpretation. However, theory should not be emphasized too early or without the proper motivation, for otherwise students might become lost in symbol gymnastics and not understand *why* they are learning the material or *what* it is they are really doing. Accordingly, I often ask students to give a qualitative description of their solutions, making sure they can explain in words the meaning and limitations of the result.

Students are often more interested in the material when it is motivated by history. They benefit from seeing the original problems that faced mathematicians for the first time, and an appreciation for these problems gives them a corresponding appreciation for the theory developed to solve them. It is for this reason that I frequently relate historical anecdotes to my students about the concepts under discussion. These serve to both motivate the material and impart a sense of humanity about the discipline.

In addition to homework and exams, I often assign "challenge problems" and extra credit assignments. These more substantial exercises give students an opportunity to achieve a new level of understanding through struggling with a difficult problem. My intent is to make students bring all the skills they have developed to bear on the problem, and in doing so build confidence in their abilities.

Finally, teachers should seek out an understanding of students' weaknesses in order to address them, lest they become lost. When grading exams, for example, I actively look for those questions that students had difficulty with. This helps me identify concepts or computations that were not well understood by the students, and it guides me in deciding what topics to review before continuing with new material.

Classroom Atmosphere

I believe the classroom experience should be characterized by active student engagement rather than passively listening to a lecture; by a feeling of congeniality, mutual respect, and also excitement at seeing new ideas unfold. To this end, I consider it vital for my students view me not merely as a professional, but also as a friendly and accessible person. At the beginning of class, I frequently set aside a couple minutes to engage the students on a personal level. I'll share a joke or amusing anecdote, and I make every effort to learn and address students by their first names. This cultivates a sense of trust and establishes a comfortable learning environment, making the students feel relaxed about asking questions or approaching me.

Although instructors typically project a sense of authority, I do not want my students to perceive me as infallible. Such an unfortunate perception suppresses students' creative tendencies and subdues their willpower to challenge the status quo. Consequently, I freely acknowledge and correct my mistakes rather than ignore or cover them up. Moreover, students should feel they are a vital part of the course and not merely bodies occupying chairs. For this reason, I periodically ask students during the lecture if they

Teaching Philosophy of Michael J. Fairchild

understand and agree with the development up to that point, querying if any example or discussion point is not understood or if clarification is needed. When students do ask questions, I respond in a direct and respectful manner to make sure there is absolutely no feeling of awkwardness or embarrassment. If asked a question whose answer eludes me, I am not reticent to respond “I don’t know, but we’ll figure it out together,” rather than give a glib response.

My goal is to establish a classroom atmosphere that makes students feel comfortable enough to ask questions, challenge what I say, and ask for help. The number of students that visit my office hours, ask for my advice (often unrelated to class), and request recommendation letters testifies to my success in these objectives. I even have a student this semester whom I’m advising for a senior project, an honor normally reserved for full faculty members.

Outside the Classroom

The classroom environment is only one way for students to interact with their instructor. Accessibility of the instructor *outside* the classroom is equally important, especially since students first struggle to understand the material when working homework assignments. In addition, students occasionally miss class, and no teacher wants their students to become lost or feel hopelessly behind. It is for these reasons that I make myself available beyond the classroom. In particular, I reliably hold office hours, respond promptly to email, and make class resources available on the web.

I dedicate a significant amount of time to making all course materials available on my department website (<http://www.math.uncc.edu/~mjfairch>). I scan my lecture notes and place them online after every lecture. I also make previous homework, quizzes, exams, and answer keys available online as well. In this way, the website serves as both a central location for all course materials and as a useful study aid for students wishing to study or catch up if they’ve missed class.

Finally, to foster camaraderie among students outside the classroom, I encourage them to study in groups and learn from one another. At the same time, I insist that each student submit his or her own work, acknowledging any substantial help received from other students or outside sources. This develops a sense of academic honesty in the student. Unless outside resources are explicitly prohibited, students are not penalized for getting help provided an appropriate citation is given.

Conclusion

As teachers, we should strive for originality in presentation and to make the subject relevant to the student by citing both history and current applications of the subject material. We should aim to cultivate a comfortable and congenial learning environment and to make ourselves accessible, both psychologically and physically, to students inside *and* outside of the classroom. We must challenge our students with interesting problems and give them a sense of accomplishment by building towards a substantial goal at semester’s end. In doing all this, we equip our students with the confidence and tools needed to learn independently and to think for themselves. Then they are ready to strike out on their own to tackle new and interesting problems.