Teaching Philosophy Statement
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A former instructor of mine, for whom I have boundless respect and admiration, through her course syllabus told us, her students, that "I cannot teach you mathematics; I can only guide you in your efforts to learn." If there is one polestar around which my educational beliefs and practices revolve, I can confidently say that this is it. However, as with any philosophy, a single phrase or slogan can hardly contain the true nature, scope, and nuance of one's methods in a single, tidy package. I shall present the touchstones of my teaching philosophy which stand out most prominently in my mind. Although I do not intend to elucidate and expound upon how these finer points are related to my mentor's sage wisdom, it is my hope that the reader will keep this phrase in mind as they learn more about the pillars upon which my methods and philosophy stand.

Establish and Maintain Community in the Classroom

A centerpiece of my teaching philosophy is that active learning requires engaged minds who are willing and prepared to discuss and present ideas to other students. For most students, this requires a bold step to accept the responsibility of producing answers, as well as the possibility of being wrong in front of their peers. Such a classroom demands an environment where students feel safe and comfortable with one another. The first day of any course I teach begins with building community with not only introductions, but immediately having students work together to come up with answers to difficult questions. In doing so, we practice being both correct and incorrect in front of our peers, and modifying our answers in light of new knowledge. Lecture is the smaller part of what I envision for a successful course. The completion of what I try to accomplish in lecture only happens when my students begin to learn from each other. A great advantage of a course structure where students do most of the talking is the opportunity for one-on-one engagement between students and instructor.

I shall highlight one particular example of a community-building exercise where I invite students to predict a visual pattern (or lack thereof) of a certain random process (known as "the chaos game"). After making sure that everyone understands the rules of the random process, I solicit answers from volunteers who know in advance that they likely will not be able to predict what will happen. Very often students make a "cloud-of-random-dots" prediction, as well as absurd predictions such as "the moon will turn to cheese." Such absurd responses are the ones that really get students into the spirit that "it's okay to be wrong," and this usually encourages a flood of new responses which fall into diverse categories of silly, interesting, funny, earnest, and even profound. When students see the resulting random approximation of an infinitely detailed, and arguably beautiful, figure emerge (the Sierpinski Triangle), students are undeniably intrigued.

After establishing a sense of trust and community with one another, we move to the task of learning mathematics. My students class time builds upon the first meeting as laid out above, in the manner I shall presently describe. Before each meeting, every student is randomly assigned to a seat, and hence, to a random group of about four students. This has the effect of not only helping students to eventually get to know every other student in the course, it also puts students into the active mindset. (Students do not simply go off "their corner" and passively receive content.)

The methods I use borrow from both traditional and active learning. First, I offer guidance and concrete examples in the form of a brief, concise lecture. All of my notes and worksheets are available to students beforehand online in formats which are friendly to all devices including tablets and mobile phones. When the lecture ends, the active phases begin, the first of which is collaborative group work. Since students are already in their groups, they are ready to work. I structure my board-work so that key examples from lecture are still on the board (as well as in students notes and short-term memory). Students may then use these examples as a template for more routine problems. The worksheets also contain problems of varying difficulty which represent, as best as possible, the entire homework set (not simply clones of the examples I presented in lecture).

The best part of the above setup is that I get to work one-on-one with students. As groups are working on the worksheet problems, I help both individual students and groups when they need it. Most of the time, however, the stronger students help the weaker students understand ideas and processes. These elements are a vital component of the course: stronger students are actively learning by explaining ideas in their own words (thereby transferring new material from short-term to long-term memory), and the weaker students are actively learning by asking questions and identifying their learning needs (thereby facilitating how to target where they need help), and everyone has the opportunity to personally interact with the instructor by asking questions about the most difficult and subtle ideas. Moreover, such personalized interaction strengthens the bond between each student and myself.

In the final stage, problem presentation, every group is responsible for choosing a representative to present one problem at the board which is randomly assigned to the group. Again, the student representative for the group articulates not only their ideas, but the ideas of the group. This is also the time when students reveal the sheer multiplicity of ways one can approach a particular problem or idea. Hence, the varied ways in which we all learn are represented when we allow students to take the lead in expressing ideas.

When students help one another, and when I demonstrate with every class meeting that I am personally invested in every student, I make good on the promise I make at the beginning of each course to build a community of learners.

Set Clear Standards and Expectations at the Outset

From the very beginning, I try to make exceedingly clear the standard to which the student will be held. To these ends, I have created web-based tools on my website, Holt.Blue (`http://holt.blue`), which puts the means of homework and exam creation into the hands of students. These web-based tools have enabled me to take an approach which is non-punitive in how students meet learning goals in the class. Automating the homework and exam creation process has enabled me both to take a practice-until-you- get-it approach, and to make learning outcomes clear from the very beginning. By using these materials in class, students get to practice the standard presented to them immediately. Moreover, when students see others' approach to problem solving, as well as well-prepared solutions written on the board written by their peers, the individual student may then proceed more confidently toward achieving this standard on their own.

Put the Means of Meeting Standards and Expectations Directly into the Hands of Students

Web-based technologies have enabled me to incorporate technology into my teaching in multiple ways that go well beyond graphing calculators, power-point slides, and course management systems. In addition to being able to make accessible routine documents such as course syllabi, worksheets, and lecture notes, I am able to help students achieve course objectives in a non-threatening, practice-until-you-get-it way that does not punish students for incorrect answers. Students may attempt an assignment as many times as they need in order to master the material, and students get instant feedback on where they may have gone wrong. Moreover, Holt.Blue has also enabled me to put the means of exam generation into the hands of students; like the homework, each exam is generated randomly using the course website, and I make this abundantly clear to students from the outset. Thus, students have unlimited opportunities for exam practice by being able to take as many practice exams as they wish. This approach has two very beneficial consequences: 1) from the very beginning, students are presented the standard to which they will be held, and 2) students have a clear path for practicing skills until they master them.

Guided Practice is Essential to Success

Before coming to Southwestern, I spent four years teaching English as a second language (ESL) at the CREF Center for Foreign Language Study in Nizhny Novgorod, Russia. In addition to teaching adult learners, I was also responsible for teaching ESL to young learners (4 to 8 years old). I find it difficult to overstate the influence this experience has had on my teaching. During this time I had to take more responsibility as an educator than I ever had to previously. If I could summarize one very prominent theme that occurred throughout the process of learning how to teach young learners, it would be that skills and concepts must be shown, not told. Anyone who has ever worked with children knows that even the most basic skills, such as using scissors, or writing letters of the alphabet, need to be demonstrated first, and then imitated by the student. These pedagogical seeds have blossomed into an understanding of how to show mathematics students what I want them learn rather than tell them. Students benefit a great deal more from help and direct guidance from the instructor than punishment for wrong answers with a bath of angry, red ink.

As a manifestation of this viewpoint in my classroom, I give my algebra students weekly writing assignments about some mathematical idea or non-standard sort of problem that they would not likely see when doing routine homework. During daily collaborative group sessions, I encourage students to consult with me directly by having them show their written work to me. I then show them exactly the changes which need to be made to in order make it perfect. Of course, my students must find their own words to articulate the idea in their own voice, and the process often requires several rounds of edits, but ultimately students produce exactly the work that I am looking for from the start. In my mind, this is perfectly analogous to helping a youngster cut along the lines with a pair of scissors.

Very often, I have seen students struggling to understand simply what is being asked of them, and then being punished for not "guessing" correctly, or simply failing to understand what the instructor had in mind from the start. My experience with young learners has taught me that,

in general, students really do want to learn, and if we make our expectations exceedingly clear, and we show students exactly what they need to do, students will rise to meet those expectations. This is why every topic we cover in class has an active component where students attempt the kind of work which they eventually will have to do on their own with individual help from their instructor.

Utilize Free Resources for the Benefit of Students

In fulfilling a what I believe to be a part of the broader mission of the community college (that is, making education more financially accessible to all), whenever possible, I try to use materials which are free to low-cost. This includes not only the web-technologies amply mentioned above, but also the use of free to low-cost textbooks which are becoming more widely available. Using such materials makes the possibility of receiving an education that much more realizable.

The use of free, web-based technology has allowed me to offer tools which students need for success at no charge. One such tool I created is a free, easy-to-use, online statistical software package which enables students to easily perform many common statistical procedures without having to purchase an expensive software package, and without having to make a significant investment of time to learn free, but less intuitive, packages. My students use the Holt.Blue statistical package to generate graphs, figures, p-values, and the like for both individual homework and group projects.

We live in a golden age of access to information and ways of disseminating knowledge. Moreover, staying abreast of these advances enables us to use them creatively to the advantage and success of our students.

Use Dynamic Tools to Illustrate Dynamic Ideas

Familiarity with the inner workings of web-based technologies has given me a supreme pedagogical advantage in illustrating marvelous, yet subtle, ideas. For instance, in my statistics courses, I can dynamically illustrate the idea of confidence intervals by allowing students to see what happens when we take repeated samples; the confidence interval changes each time, dancing around a known parameter. Another example is limit ideas from calculus: seeing a secant line actually approach a tangent line, or an area approximation exhaust the true area under a curve gives students a true sense of the dynamic nature of the material. Web-based technology has enabled me to impart a visceral understanding of such delicate ideas in a way which simply is not possible with a white-board.

Emphasize and Celebrate the Interdisciplinary Nature of Learning

From applications I have developed for my students, to popular websites I have created and still maintain, developing online tools has drawn upon a large cross-section of the skills, concepts, and tastes which I acquired in both my undergraduate and graduate studies: research skills, mathematics, graphic design, computer programming, a love of language, a solid understanding of general grammatical concepts, the pedagogy of reading, business administration, psychology, communication studies, and even history. Ideas and attitudes found in all these are all well represented not only in the web-based technologies I have developed for my students, but ultimately my overall teaching. These experiences have brought together so much of what I have learned in an incredibly

satisfying way. Moreover, they have helped me to stay current with my own discipline and to expand my understanding of how my specialty seamlessly weaves into the larger fabric of human knowledge. The above has reinforced in me the belief that true learning is interdisciplinary and spectral; rather than consisting of compartmentalized and non-intersecting units called "subjects" or "disciplines," true learning involves understanding the overlapping, connected, dynamic, and self-interacting nature of knowledge. It is my hope that I might impart this idea to my students by meaningfully incorporating as many disciplines as possible into my instruction.

Whether it is showing that Hindu-Arabic numerals are one of the most brilliant inventions in history, or solving real problems of volume and area taken from ancient Babylonian cuneiform tablets, my students get a large dose of the importance of our discipline from a humanities context. Every course we teach is filled with examples of mathematical gems which have either elevated our quality of life, or have given us profound, unprecedented insight into the workings of the universe. Whether the subject is how Dr. John Snow used data collection to end a cholera epidemic (and in doing so, changed the course of humanity by helping to usher in modern epidemiology), or how Issac Newton modeled the paths of heavenly bodies using calculus (another monumental invention of the human mind whose influence on humankind is impossible to overstate), all levels of mathematics speak to our humanity and our innate desire to improve, innovate, and to understand our world.

Mathematics is Essential to Being an Informed Citizen

In all of my courses, whether the topic is drawing useful conclusions from data, or understanding what makes a valid argument, I maintain that a socially responsible citizen must know some mathematics. Leaders, industry, the media, and anyone who might stand to benefit from an ignorant population, will assuredly try to persuade, and perhaps even deliberately mislead, with both verbal and numerical arguments. An innumerate population is defenseless against quantitative shenanigans that look polished on the surface, but at their core are the numerical equivalent of smoke and mirrors. A population which is unable to craft, construct, read, understand, and interpret numerical arguments is easier to bamboozle and subjugate. In this way, it is my steadfast conviction that mathematics is essential to being an informed citizen, and hence, to maintaining a free society.

I try to motivate my students to learn mathematics not only from the standpoint of being well rounded and broadly educated, but also through the lens of becoming informed and able participants in a society that demands a citizenry that knows how to warily interpret both verbal and numerical arguments.