Teaching Statement

Janet C. Vassilev

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As a mathematician, I enjoy working a good math problem for both the challenge and the pure joy of finding the solution. We as math teachers, need to make students more active in the learning process. If the students don't personally connect with mathematics, they will struggle to recall what they have learned. As a math educator, I have seen that effective questions asked of the students during class have encouraged more students to become active mathematics learners.

As teachers, it is important that we also engage in the learning process. I have gained much insight from my students through various experiments that I have done with course work in my classes. When teaching combinatorics at University of Arkansas, I asked my students to give group presentations. They all prepared beautiful and poignant power point "shows", some almost like game shows. This inspired me to develop game shows for my summer Survey of Calculus class which is geared toward students who struggled with mathematics. Twice a week, we would break mid-class for a game show. The students became contestants in my power point game shows. They competed for extra credit in the shows by solving problems in front of their classmates. The show was such a success; I had over one third of my students in my office hours working with me and their classmates to understand calculus in order to win the chance for bonus points in the game show. Through the game show the students engaged in the course and enjoyed learning calculus.

Eight years ago I had the opportunity to work on improving the traditional calculus teaching at the University of Arkansas. In my experience teaching calculus, I had seen the need for more extensive student involvement in the course. I called on students regularly to come to the board to solve problems or to summarize what they had read in the book for homework. Also, in addition to in class exams, students were allowed to come by my office for oral exams to make up for some of the points they missed on the exams. These opportunities allowed the students to understand calculus as a teacher does. They saw that just writing floating mathematical expressions on the board could not help their fellow students to grasp the concepts. They needed to think through their answers and explain them carefully. I also had problem sessions where students could work together on some challenging problems in additions to their collected daily homework. Not all students participated in class or in the problem sessions, but those who did saw tremendous increases in their skill level by the end of the course.

In transition courses like discrete mathematics, linear algebra or introduction to abstract algebra, keeping the students interested in the mathematical rigor rather than pure problem solving is extremely important. Some of the students who have been quite capable in calculus, struggle with their first proofs. Doing a proof is like solving a puzzle; the puzzle pieces are the definitions, propositions and theorems and key examples learned in class. Keeping the students fluent in class vocabulary is a must. It is difficult for students to prove that a map between groups is a homomorphism if they don't know what a homomorphism is. I start every class with a short quiz, which checks whether they know the concepts from our last class. The students look forward to these quizzes and they keep the students on top of the material. In these classes, I also ease the students into their first proofs. Sometimes, I will write out the proof sentence by sentence, then cut it up and let the students put the sentences together to make a proof. Other times, I will give them an outline of a proof and have them get together in groups to flesh the proof out. The first proofs are usually short, connecting a few true statements together. As the students become fluent in proof techniques they gain a deeper understanding of the theory and some of them become exhilarated by the challenge of proving more complex statements.

We need to keep mathematical thinking alive in our students and the students of future generations. Here in New Mexico, I have been the Co-Director of the UNM-PNM State Math Contest. Along with Dimiter Vassilev, we formulate challenging problems for the best students of the state to challenge themselves mathematically. Each Fall, around 1000 students compete at their schools in Round I and then the top 25 percent come to UNM to compete in Round II. After grading Round II, we award the top 22 students with money graciously provided by the PNM Foundation. At the Annual Banquet we meet the winners, their parents and teachers. We hear every year what a great service we are doing for these exceptional students and that the students look forward to this yearly challenge. Many of the participating students have also been honored in the AMC-8, AMC-10, AMC-12 and participate in the USAMO. These winners tell us what great preparation our test is for these other challenging math contests.

I liken teaching math to putting together a collection of gigantic free form jigsaw puzzles all at once. Prior to a course, each student has learned various mathematical concepts and formed some connections among these ideas. Conceptually, each student comes into a course with some pieces of his or her puzzle pre-assembled. During regular class meetings, I will introduce new mathematical ideas and methods for proofs and solving problems; pointing out puzzle pieces to the students. I will justify proofs and give sufficient examples for the students to make connections to their amassed mathematical knowledge; giving the students a plan to put their pieces together. The students are assigned homework to master the material in the course; the students try to join their jigsaw pieces together. To be effective, I collect and grade course work in order to give the students feedback; allowing the students to affirm their piece placement. At the end of the course, I hope to have added to each student's collected mathematical insight, reshaping each student's puzzle. Since the process of learning never ends, the student will hopefully continue his or her puzzle in other math classes.

On the following page, I have included a list of the courses which I have taught throughout my academic career.

Teaching Experience

University of New Mexico

Spring 2011	Theory of Numbers (319), Modern Algebra II (421)
Fall 2010	Combinatorics (317), Modern Algebra I (322/422)
Spring 2010	Elements of Calculus (180), Advanced Calculus (402/502)
Fall 2009	Discrete Structures (327), Advanced Calculus (401/501)
Spring 2009	Abstract Algebra (521), Complex Analysis (562)
Fall 2008	First Year Calculus (162), Abstract Algebra (520)

University of California, Riverside

Spring 2008	First Year Calculus (9B), Set Theory
Winter 2008	First Year Calculus (9C), Linear Algebra II
Fall 2007	First Year Calculus (9B), Optimization (120)
Spring 2007	Geometry (133)
Winter 2007	First Year Calculus (9C), Multivariable Calculus (10A) and Linear Algebra II
Fall 2006	First Year Calculus (9A) and Linear Algebra I
Spring 2006	First Year Calculus (9B and 9C)
Winter 2006	Differential Equations
Fall 2005	First Year Calculus (9A)

University of Arkansas

Spring 2005	Linear Algebra and Math Structures II
Fall 2004	Calculus I and Intro to Abstract Algebra
Summer 2004	Institute for Middle Level Math Teachers
Spring 2004	Calculus II (Geared toward retention)
Fall 2003	Calculus I (Geared toward retention)
Spring 2003	Combinatorics, Algebra I
Fall 2002	Discrete Mathematics, Intro to Abstract Algebra II
Summer 2002	Survey of Calculus
Spring 2002	Calculus II, Combinatorics
Fall 2001	Calculus II, Intro to Abstract Algebra I
Summer 2001	Survey of Calculus, Finite Dimensional Vector Spaces
Spring 2001	Calculus II, Algebra I
Fall 2000	Intro to Abstract Algebra II, Algebra II

Virginia Commonwealth University

Spring 2000	Calculus with Analytic Geometry I, Mathematical Structures
Fall 1999	Calculus with Analytic Geometry I, Intro to Abstract Algebra
Spring 1999	Abstract Algebra II
Fall 1998	Abstract Algebra I, Linear Algebra
Spring 1998	Intro to Contemporary Math, Linear Algebra

Purdue University

Fall 1997	Introductory Analysis II