

In Focus...

Teaching InterMath: An Instructor's Success

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This paper discusses the InterMath courses from the perspective of an instructor. The instructor writing this paper was teaching her sixth InterMath course in the same school system at the time this was written. This paper describes a typical InterMath class and the success stories of many of the teachers participating in the courses. The instructor also reflects upon her growth as a teacher during her experience with InterMath.

When I was a classroom teacher, I often found myself thinking about how I could be a better teacher. When I decided to pursue my doctorate, my thinking shifted to how I could help others be better teachers. I have always had an innate need to help others and I found my vessel in teaching InterMath professional development courses.

InterMath is a five-course series including Number Sense, Algebra, Geometry, Data Analysis, and an alignment course for the Georgia Performance Standards (GPS). The first four courses allow middle grades teachers to gain a mathematics concentration, which is a recently added requirement for Georgia middle school mathematics teachers. The GPS alignment course was added to assist teachers in dealing with the new state-mandated standards. In the InterMath GPS course, teachers build their content knowledge and gain a better understanding of the GPS through exploration of problems.

Taking an InterMath course is a big commitment. The participating teachers attend a weekly 4-hour class after they have been teaching all day. Each of the courses that I have instructed required 50 seat hours from the teachers, which allows them to earn 5 Professional Learning Units. When I was teaching high school, I am pretty sure that I would not have been as committed as these teachers have been.

In the InterMath courses, teachers are allowed to explore mathematics with technology. A typical InterMath session involves the whole class looking at the syllabus on-line, reading the topics to be covered in the lesson, choosing a problem (or two or three) to examine together, and then choosing a problem to investigate and write up. We have been known to spend over an hour on one problem!

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Three goals of the InterMath course are for participants to learn mathematical content, to use different technologies (spreadsheets, Geometer's Sketchpad® (GSP) (Jackiw, 1993), graphing calculators, etc.) to explore the mathematics, and to think about their teaching and their students' learning. I have no doubt that the first two goals are always accomplished. While all of the participants have a varying degree of mathematical understanding and technological savvy, they all learn something about mathematics and technology. The third goal is a little harder to recognize and poses a greater challenge for the instructor. That is what I love about teaching InterMath – getting the teachers to think about their practice. To *really* think about it.

The abilities of my students in InterMath courses have been as diverse as their experiences as teachers. I have taught primary, elementary, middle, and high school teachers. I have taught mathematics, science, social studies, special education, and home economics teachers. My participants have ranged from highly confident in technology and/or mathematics to having very low confidence in these areas. All of the participants start and finish the course in different places, but they all learn from each other and get to think!

I know that I have had success getting the teachers to think deeply about mathematics. Several teachers have expressed that they did not know that there were so many ways to solve the same problem and that no single approach seemed to be better than others. Often the approach depended on where the students were mathematically when they were trying to solve the problem. Teachers expressing this thought, including a kindergarten teacher, were proud to learn so much mathematics while never being made to feel inferior to more proficient mathematics teachers.

I consider anyone who completes an InterMath course to be successful because it is a large commitment of time and effort. Of course, there have been exceptional cases where teachers went beyond my

expectations for them in the course. For example, a special education teacher often took technologies that she mastered into her classroom. Her students often relied on technology to communicate so she had access to it in her classroom and wanted to use it as much as possible with her students. Before the InterMath class, she had never used Geometer's Sketchpad or a spreadsheet program to explore and solve a mathematics problem. During that semester, she allowed her students to use GSP to construct geometric shapes and created a lesson for students to explore the real-life situations of payroll and budget using a spreadsheet.

For many participants, success meant mastering mathematical content. Another special education teacher, who is currently enrolled in her third InterMath course, had to take content exams in order to continue teaching the different subjects to her students. She was most worried about the mathematics test but was overcome with relief when she looked over the test. She reported recognizing a lot of the mathematics from our InterMath classes. She passed with a 92% and was amazed at her inner mathematician. I would be unaware of many of my students' successes if they had not decided to share them with me. I always get so excited when I find a teacher who is thinking on the next level – one who is thinking about students and learning instead of only focusing on himself as the teacher. It always makes me proud to think that I may have contributed to that.

As the instructor, I also had a major success of my own. Coming from a more traditional background, I taught my first InterMath course in a more directed manner. These classes had a different procedure than the InterMath courses previously discussed. Once the participants had read what topics would be covered during the class, I went to the board and methodically talked about each topic. I had a nagging suspicion that this was not the way that InterMath was meant to be taught. Sometime during my third course, I experienced a paradigm shift. I realized that the content was still addressed in the exploration of the problems even if I did not try to pour it into the minds of the participants beforehand. This idea of teaching was not new to me, as I had read research, listened to discussions, and thought about it often. However, I was unable to simply pick up the teaching ideas and implement them. I had to first re-work my philosophy of what constitutes mathematics, how it should be taught and how students learn. This kind of change in

thinking is a difficult one for many teachers, myself included.

The biggest part of my paradigm shift probably came from my newfound ability to say, "I don't know." As a student, I had always thought that the teacher was the knower of all things mathematical. As a teacher, I had to realize that I do not always have the answer and that there may not even be one. In my classes, we explore the problems and learn together from each other. Of course, there are many instances where the participants in the class ask me for *the* answer placing me in the position of the knower of all things mathematical. Instead of telling them *my* answer, I push them more to rely on each other and themselves. I think that this realization has made me a more honest instructor, which seems to be appreciated by the participants in the classes.

My teaching philosophy has changed dramatically. Now we discuss the mathematics as it comes up during an exploration rather than me just trying to pass on what I know about the mathematics to the participants. We may not cover all of the pre-determined topics for the night and we may cover other topics not included in the syllabus, but the content inevitably gets covered during the semester. We have richer discussions because I have learned to embrace the fact that everyone in the class has different abilities and interests. Those who may think they know all of the mathematics are sure to learn something from someone who is a lot less confident. Those who lack mathematical confidence are sure to learn from those who have already made mathematical connections.

I have had success as an instructor in helping the participants think about mathematics, students, teaching practices, and even life in general. Also, of major importance is the success that I have experienced in my growth as a teacher. I, too, have learned a lot from the InterMath courses and I consider that a great success.

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References

Jackiw, N. (1993). *The Geometer's Sketchpad* [Computer software]. Berkeley, CA: Key Curriculum Press.