

One teachers journey into the world of classroom technology

Technology in Practice Strand

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One of the Principles for School Mathematics as prescribed by the National Council of Teachers of Mathematics reads, “Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students’ learning. As a teacher of secondary mathematics, Naomi Fried-Kokason decided to embrace change and shift her teaching practice away from what has been traditionally done since the beginning of formal education to a classroom of the 21st century by infusing technology into her classroom. There are a great many technologies that are designed to use in the classroom of the 21st century, a teacher can be overwhelmed trying to navigate their way to finding the technology that works for them. After researching many of the technologies that are available, Mrs. Kokason has integrated TI handheld technology, interactive white boards, and tablet PCs into her day to day classroom activities. This session will be a discussion of how this was accomplished and how others can make the shift as well.

How do I compete with the increasing use of technology in my students' lives? That is the question I found myself asking as I began to explore avenues that would bring technology into my mathematics classroom. The year was 2002, the beginning of the 21st century, and I was still doing all of my instruction on a white board, stuck in the 20th century. The only aspect to my classroom that kept my students engaged was my use of different colors and my entertaining personality.

The first medium of technology I began to use was graphing calculators. Even though graphing calculators had been in use since the 1980's, they were still being viewed as a tool to be used in higher level mathematics classes like Trigonometry and Calculus. I taught first year Algebra and Geometry, I wanted to find a way to use graphing calculators in these level classes. As luck would have it, I came across a flyer for a two week workshop being offered over the summer on the use of graphing calculators in first year Algebra classes. In this class I discovered how to use the TI-83 to assist my students in gaining a deeper understand of linear and quadratic equations by showing them the connection between data collected as a table of values, the graph of the data and the equation of the function that tied it all together. I also discovered an application named "Geomaster". This application allowed me to discover ways I could help my students grasp the visual aspects of theorems that we traditionally proved using two column proofs. Finally I had the means to begin to compete with video games in my classroom.

When it comes to using technology in the classroom, you can only use what you are comfortable using. There was computer software, like "Geo Sketchpad" that teachers were using in computer labs but at this time we were lucky if we had a single computer in our classrooms, the thought of an LCD projector was unimaginable. With the graphing calculator I could use an overhead projector. Hence, it was truly something I could use on a daily basis. I became such a fan of the graphing calculator that I became involved with Teachers Teaching with Technology, T³. I began sharing my knowledge with other teachers in the form of workshops and presentations. I began as a TFAS instructor (Technology for all Students), then I advanced to a regional instructor and eventually became a national instructor for the T³ organization, which is celebrating their 25th anniversary this year.

For the first three years I used graphing calculator technology in my classroom all I had was one unit and an overhead projector. Eventually I was able to get a class set of TI-83's. This enabled me to get the technology into my students' hands. Eventually I got a class set of TI-84's, and now I use the TI Nspires and a Navigator system.

As I became the expert at TI technology, I became interested in other technologies that would help to make my teaching practice more inviting to students. In 2005, I was chosen to participate in a grant program through my district. I was given a computer laptop cart with 20 laptops to use in my classroom, an LCD projector and an Active Board. This was my first experience with pen and touch technology.

As I stated before, when it comes to using technology in the classroom, you can only use what you are comfortable using. I was not comfortable using the laptops with my students, so I wheeled the cart next door to my English partner. As for the activeboard, I was in love, and I was able to use it in conjunction with my TI technology, as for the smartboard software had just been released. The smartboard is a virtual TI-84 for the computer. By running the smartboard software while projecting onto the activeboard created a calculator that could be manipulated via the activeboard pen in the classroom.

I loved writing on the activeboard. I was able to use the shapes for Geometry, pull up an instant coordinate plane for Algebra, I could use different colors, and best of all I could export my notes into a PDF and save them. I vowed to never use a whiteboard again.

In 2006, I transferred to a different school. When the principal hired me he was not able to promise me an activeboard, but he was able to promise me smartboard. I accepted the position. I discovered that he was able to make this promise because the district had purchased a smartboard for the mathematics department, but no one was using it. In fact, I found it tucked in the back of the math department office collecting dust. I wheeled it to my classroom and began to learn the similarities and differences between the two brands of interactive white boards. It is very similar to PC versus Mac in the world of computers. The main difference was that the activeboard required a stylus to write on it, but the smartboard could be written on using the special stylus pens or with one's finger touch. Both allowed me to export the notes I wrote during class as a PDF. The new school that I was at had a website that had a page dedicated to each teacher. I began to post the notes and homework assignments daily.

With the notes and assignments posted on the schools website, students who are absent can still access the notes they missed. Parents can keep better track of their child's assignments. Also, parents have access to the lessons I teach, so they can help their children at home. I have many parents comment that they are understanding topics that they were weak in when they took mathematics courses when they had been in school. They comment that the color coordinating makes a huge difference in being able to follow the steps of a problem and understand what is being done. I have even had past students tell me that even though they are no longer enrolled in my classes, they still use my notes when they are confused by their current teacher.

By the fall of 2007 I had acquired a TI Navigator system. This consisted of hubs that the students plugged their TI-84s into and then I plugged an access point into my computer, and I could communicate with each student via my computer. I could send questions to the students and get instant feedback. I could allow students to graph a line from their handheld onto the board without getting out of their seats. Math class had become a class that students wanted to attend. The technology was helping me bring my math class to life and compete with the ever increasing technology that my students were using in their daily lives outside of school.

Unfortunately, by the end of the year, my computer was beginning to have problems. It was not able to keep up with the demand of the ever growing technology that I was continually adding to my classroom. It was time to purchase a new laptop. I had recently learned about a new type of laptop which enabled the user to write on it as if they were writing on a piece of paper. It was called a Tablet PC. I began to investigate the pros and cons of purchasing a tablet PC instead of a traditional laptop. My main concern was that I needed a computer that ran on XP Pro. The navigator system required it. It turned out that the XP tablet edition was XP pro based, so I would be able to use it in conjunction with my Navigator and graphing calculator technologies, so I purchased my first tablet PC.

When I first began teaching, I wrote on a chalkboard. The largest problem with writing on the chalkboard was that my students seemed to have a talking switch. It was activated when I turned my back to them to write on the board. The solution to this problem was to switch to writing on an overhead projector. This would allow me to always face the students. The problem with this was that I am left handed. As I would write on the projector, my hand would slide off the writing and smear it. I also ended up with blue and black hands by the end of the day. When white boards were installed I loved being able to use different color pens, but I found I was flipping the talking switch back on whenever my back was to the class as I wrote on it. Then, in 2008 I purchased my first tablet PC. Now I could face the class as I wrote on the board and not worry about my hand whipping out or blocking what I had written. I was able to use different colors to help my students understand the different steps followed when solving equations. I do not find myself writing the same things over and over again each period. Now I can save the notes and reuse them with the next class. Students in my morning classes know that they should be sure to check the notes as for things may have been added or changed throughout the day. I have textbooks on CD. I am able to project pages from the textbook on the screen and I am able to write on them using my tablet. The snipping tool in windows 7 allows me to cut and paste problems from the text book right into the notes. In fact, the snipping tool revolutionized how I make assessments and other class handouts. I was still able to use the smartboard software that was installed in my tablet, so I still had access to shapes, coordinate planes and even a compass. Plus, I was able to run all the programs I used when working with the TI-84s and Navigator system. Finally, I could also use power point presentations and videos I found to assist with my instruction. As for my SMARTBOARD itself, I had used it to the point of wearing it out the computer chip. It had become impossible to keep calibrated. I have also found that in high school, many students do not want to come up front and write on the board, and believe it or not, they were very hesitant to write on the smartboard. Once I got my tablet, it became a very nice screen to project upon. Another bonus to using my tablet is that my file cabinets are empty. I am able to make and store all assessments and other handouts that I make in my tablet.

The next year TI introduced the Nspire, the new generation of hand held technology. Unlike a traditional calculator it is document based and menu driven. If a person can work a computer, they can work an Nspire. As an instructor for TI I managed to get a class set of Nspires. A year

or two later they came out with the Nspire Navigator system which consisted of wireless sleds that the Nspires slide into. I would say that the best feature of the Nspire Navigator is that I have the ability to do a screen capture of all of my students, which are logged into the system, handhelds. I am able to see exactly what they are doing with the technology from my computer. Also, I have the ability to make a student the presenter. This means that at any time I can choose a student's handheld to be projected in front of the entire class. They get to work the controls.

Two summers ago I received an email inviting mathematics teacher to participate in a weeklong workshop during the summer. There was no charge to participate. It was being offered through Pepperdine University and was funded by a National Science Foundation grant. The focus of the workshop was digital media. Earlier that year, the film teacher and I had gotten together to create a weekly show that was broadcast on the schools in house television channel. We called our program "Math in Motion". The focus was to assist out students in doing better on the California High School Exit Exam (CaHSEE). Since the exam is comprised of questions based mainly on the 6th and 7th grade standards we found that many of our students needed refresher on the types of problems they had not seen since middle school. For our program I would write math questions that could be made into a story. The students we worked with would take the problem and develop a script. They would then film the problem. The following week I would deliver the solution dressed as a character I created called Commander Koke. At first the students would film me doing the solution on my white board. Then I began to prepare the solutions on my tablet pc. I could then give the PDF to the film teacher and they could cut it into the film. The only problem was that I had to find the time to get together with the film teacher to do the voice over. Hence, I was very interested to see how this workshop in digital media might help us improve our program. During this workshop we learned how to use a program called Camtasia to create and produce our own mathematics videos.

The program is called Teachers Create. It is a worldwide program whose focus is to create a repository of mathematics videos that teacher and students all over the world would have access to view and use. I loved the idea of creating videos that my students would have access to outside of the classroom. I could create an instructional video on a topic that I have taught in my math class and make it available to my students on the worldwide web. I envisioned my students using the videos at home, when they were doing their homework. They could use the instruction to help them with the problems. It was a way to give them access to my explanation 24 hours a day. Also, they would have the ability to pause and rewind. No more excuse that I was talking too fast in class for them to follow. The video would allow them to go at their own pace. This was the next step in using technology in the classroom for me.

The best part about the teacher create program is that the focus is not really on creating math videos as much as it is on the pedagogy that is involved in making the video. When a teacher is in class talking answer questions in interact with the students. When you make a video, you have to anticipate the questions students will have and the difficulty they might have with the topics.

Also, it is very important to be mathematically correct. There are too many people who make videos that have incorrect information.

Another aspect of the program is to bring in students to work side by side with the teachers. Eventually it students will be making videos also. I found that working with a student forced me to be even more careful with what I might say in a video. Also, by having a student work with me, I could get instant feedback on whether or not something I said or did made sense to the student. If the video confused the student working with me, then it would definitely confuse a student whom would be watching the video at home. Also, by getting the students involved in making the videos, we were able to get a better understanding of how the students understood the concepts, and how they would explain them. This would also help students to be more involved in the process of learning mathematics rather than just taking notes in a math class, doing the homework, then taking an assessment that the teacher then had to correct and try to figure out what they needed to go back and reteach. In fact, having students make videos is a form of alternative assessment. I also use the videos in my classroom as a break in the lesson. When I see in person my students' reactions to the videos, it encourages me to make more videos. It has gotten to where students are making requests for what videos on specific topics.

After that first summer, I no longer had to find time to do the voice over of the solution to the problem of our weekly math in motion episode. Now I am able to create the solution, and even spouse it up with special effects on my own. Now I just hand the film teacher a MP4 file that he edits into the student work.

Over the last ten years my classroom has evolved. If you were to have walked into my classroom in 2002 you would see rows of desks facing a whiteboard. Today, in 2012, when you walk into my classroom you will see rows of desks facing a smartboard. An LDC projector connected to my tablet PC. On each desk you will see students using their handheld Nspire with Navigator. Students will be focused and engaged in the learning of mathematics. They will not be frantically writing notes which are what used to be everything I wrote on the board with no regard for what I was saying. They will be relaxed and engaged in discourse. This is because the notes that I write on the board will be posted later in the day, along with the homework assignment, on my web page on the school's website.

Out of all the technology that I now use in my classroom, if I was told I had to choose the one thing that has impacted my teaching practice the most, I would choose my tablet pc. In the past, when there was talk of using computers for mathematics, I was against it. Doing mathematics requires the ability to write out the computations. Mathtype is great for creating expressions and equations to create assessments and handouts, but it is not practical for working the problems out without having to skip steps. I really do not know how I would ever be able to go back to teaching without my tablet. I hope I never have to find out.