

Sometimes the best high tech is low tech.

**Michael Pruner – Vice President BCAMT (mpruner@sd44.ca)
Mathematics Teacher, Argyle Secondary School, North Vancouver**

I'm a high tech math teacher. I use a tablet pc throughout my lessons, I use i-clickers to gauge student progress and understanding, I record all of my lessons to post on my website, and I frequently use applications and websites to help students understand concepts; and yet, the technology that has fully transformed my teaching and my classroom fits in the palm of a hand, costs less than a calculator, and has no electronic parts.



For nineteen years, I felt pretty good about my teaching. I believed I was on the “cutting edge” because of all of the high tech “goodies” that I continued to implement; however, I was always bothered by a certain ineffectiveness in most of my classes. By ineffective, I mean a general inattentiveness, lack of engagement, and apathy amongst most of my students. I’m not referring to my honours classes or my top students of course, but pretty much everyone else was uninterested, unmotivated, and uncommitted to learning mathematics. In recent years, I thought I just needed to perform better, be more funny (hard to imagine... I know), or provide more incentives to learn. I think I succeeded at all three of these self-improvements, but the general culture in my class was not changing.

Then, twelve months ago, I attended a teaching conference where Peter Liljedahl gave the key note address. He spoke directly to this ineffectiveness that I was experiencing, and provoked me to make some changes. I began to change the culture in my classroom. Three significant changes to my traditional classroom were all that was needed to begin the transformation:

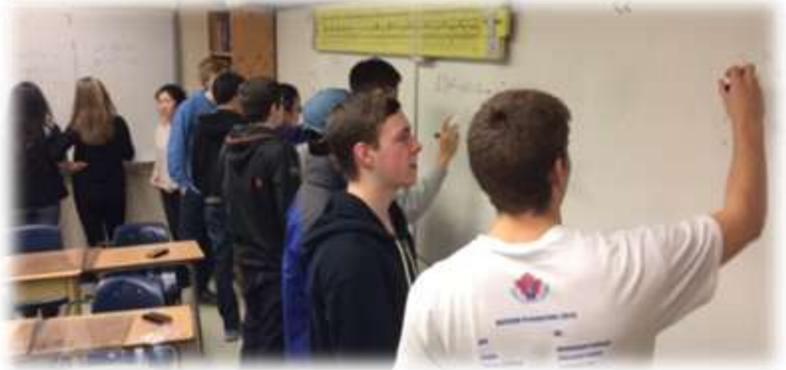
1. Visibly Random Groups
2. Vertical Non-Permanent Surfaces
3. No more notes

I’ll speak briefly here to each of these changes, and I plan to expand on them in my presentation.

1. I’ve always had a seating plan. I thought it was essential for classroom management. If one student is disrupting another, then I simply massaged the seating plan until I had an arrangement where the class was quiet and able to “learn.” The problem with seating plans, no matter how carefully crafted, is that students settle into roles quite quickly. By randomizing the seats every single day, students are frequently sitting beside different

people and having to re-discover their own roles in a group scenario. Randomizing groups keeps everyone just a little on edge, which seems to help with engagement and participation.

2. Vertical Non-Permanent Surfaces (VNS) can come in many shapes and sizes. My students use whiteboards that cover all of the walls in my classroom; however, if you don't have whiteboards, you could let your class write on the windows, you could buy Plexiglas from your local hardware store and fasten this to your walls, or you could give up the "vertical" component and have your students write on their desks or even the floor (I've tried all of the above). VNS do three things in a class.



- a. Because the writing surface is non-permanent (unlike notebooks or poster boards), students are much more willing to take a chance and participate in the problem solving activity.

- b. There is a certain degree of novelty that doesn't appear to decline. Students typically enjoy this aspect of my class tremendously. Also, groups are better able to work through their problems on the larger surfaces.

- c. Because the surfaces are vertical, the group's work is public, and this provides many advantages. As a teacher, I can see quite easily which group needs my attention. Students are not able to hide their inactivity. And groups can easily share ideas with other groups as they work through problems.

3. No more notes. This was a big change from my old classroom, but it was really quite natural after implementing VNS's. Freeing students from note-taking allowed them to spend all of their energy on the problem solving and collaboration that I always valued in a lesson. It also freed the class from the many distractions that an open notebook can present. Now, at the beginning of every class, I have students move all of their books, jackets, and bags to a remote corner of my room. When students are sitting in their groups, they have nothing... just one whiteboard pen.

After implementing these three low tech changes to my classroom twelve months ago, I have found a whole new energy and love for my job. I have made other smaller changes as well that I will elaborate more on during my presentation:

I have moved to a more problem based lesson where problems are posed at the beginning of a lesson with little to no instruction. I have changed the way I give quizzes by allowing virtually all of my quizzes to be written in pairs. The collaboration seen during a partner's quiz is really quite remarkable. I have changed the way I answer student questions by answering only the questions that will promote further thinking. And, I have also changed where I teach from in the room. I used to have "lectern" at the front of my room where I would spend most of my time orchestrating my lessons. The lectern has been removed, and I now stand and work amongst the students as we all struggle toward solutions in our problems. These are all smaller, more subtle, changes that have been made over time, but the big three changes had the largest impact. Visibly random groups, vertical non-permanent surfaces, and no notes were the three changes that precipitated a new, active, and engaged problem-solving culture in my classroom.

I now feel energized as I make my way around the room dealing with the productive chaos. I can see who needs attention, as they are all working on vertical surfaces. I gently nudge these groups in the right direction by answering their questions with crafty counter-questions – this is where the art of teaching shines. Instantly after implementing these changes, I noticed almost whole-class engagement in the lesson, an increase in energy and excitement in my students and more noise in my class.



I'm a high tech math teacher. I still use all of my high tech goodies throughout my classes, but I no longer find them as important for the learning in my class. Today, my most prized technology to help with student engagement and problem solving in mathematics is the whiteboard pen.