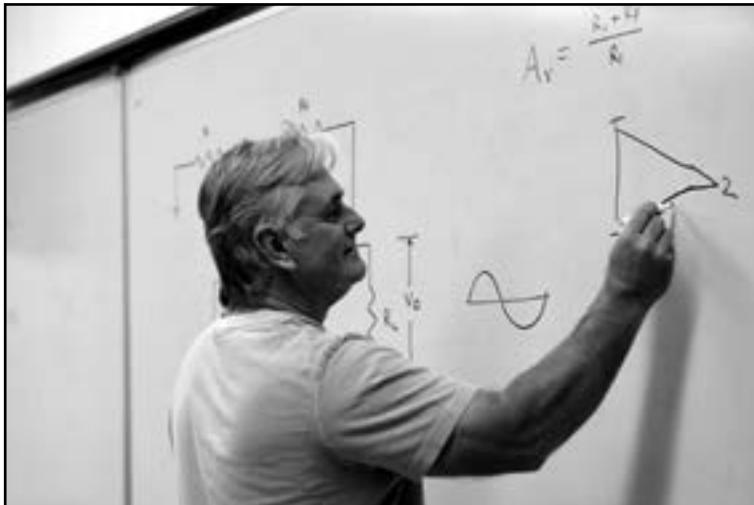


# *Stepping Over the Line: Applying the Theories of Adult Learning in a GED Math Class*

*By*

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## PRACTITIONER PERSPECTIVE



**A**s a child, I loved watching old Warner Brothers cartoons. One of my favorite character combinations was Bugs Bunny and Yosemite Sam. Invariably, at some point during the cartoon, Bugs Bunny would draw a line in the dirt with his foot and say, “I dare you to step over this line.” Yosemite Sam would step over and reply, “I’m a-steppin.” Bugs Bunny stepped back and drew another line and say, “I dare you to step over THIS line.” Again, Yosemite Sam would step over and say, “I’m a-steppin agin.” This scenario was repeated until Bugs Bunny had maneuvered Yosemite Sam to the edge of a cliff or in front of an oncoming train. Even though Yosemite Sam was in mortal danger, he always took the challenge to step over the line.

In school we are taught to “stay in line” and “color inside the lines.” The connotation of stepping over the line is that you have gone too far in a negative way. But in my recent experiences of being a new adult education graduate student and teacher of a GED Math class, I have found a new meaning for “stepping over the line,” and it is turning out to be a very good thing.

All of my life there has been an invisible line at the front of each math class, whether I had the role of a student or a teacher. The chalkboard of my childhood has been replaced by the whiteboard, but it is always

the focus of a math class. And the teacher is always standing in front of that board. Going to the board as a student was often terrifying, and as a teacher it is a struggle to get students to solve problems in front of the class. So it is common for teachers to become too comfortable standing at the whiteboard and talking at the students, all the while reinforcing that invisible line between the teacher and the students.

In the Master of Arts in Adult Education program at San Francisco State University, the graduate students are learning Malcom Knowles' theory of andragogy, how adults are more self-directed than children, and how adults bring more experiences to the classroom (Boucouvalas & Lawrence, 2010). The graduate students and the professor sit in a circle, discuss and debate in large and small groups, and employ facilitation in learning new topics. The students have an active role in shaping the course of the discussions and readily share their life experiences relevant to the topic.

I was determined to try to incorporate some of these learner-focused teaching techniques and explore ways to adapt them to my GED math learners. My primary goal as a new teacher was to find ways of getting students to participate more in the classroom as a first step towards building community and learning to work together. I reasoned that if students could present their solutions to the class at the whiteboard, then productive student-to-student discussions about math might follow. After a few attempts and failures, I stumbled into ways of incorporating facilitation and collaborative learning into my math class curriculum that draws little lines in the dirt for them to step over. Stepping over these little lines leads to increased knowledge and greater self-confidence in solving math problems as individuals and with other students. And when my students learned to cross that line more freely to the whiteboard, I learned to cross that line into being a student with them. This reflection shows how my

adult learners and I have created a collaborative and supportive learning environment in the classroom where we are all solvers of math problems.

## Background

For the 2015-16 school year, the GED morning math classes were on Mondays and Tuesdays from 9 a.m. to Noon. For the GED-Ready math class that I taught, the students had to score at least 145 on the GED-Ready pre-test. Those students who had scored less than 145 were assigned to another class. This score cutoff allowed for an even split of the students and was appropriate given that a passing score on the GED tests was 150. My objective was to cover primarily algebra and geometry so the students could pass the GED Math Test at the end of the semester.

## Getting Students to the Whiteboard

I started off with traditional lectures for the first few days in the semester. I spent time getting to know their names, and I asked them to read problems out of the book to gauge their English language skills. On the second day of class, the homework assignments began. As I told the learners, in an ideal world they would go home and do the homework listed on the syllabus before the next class. But in the real world, life often gets in the way of homework. So every morning thereafter we started off the day doing a homework warm-up for 30 to 45 minutes. For students who had done the assigned homework, there were new problems to try in class. For students who did not complete the homework, they had time to work on the homework during the warm-up.

When I first started teaching adult school, I noticed that adult students rarely asked questions, even though it appeared many did not know what to do. So I learned to be specific and I ask, very quietly, little questions of students while I circulate and look over their work: What problem are you working on? Have you tried this one? Did you

check your answer? The first few weeks of class, the students appeared awkward and uncomfortable with me approaching them at their desks. It took them a few days for them to realize that I was trying to catch them solving problems right. I praised them and pointed out what they are doing correctly and asked them to solve another problem like that one. When I saw mistakes, I tried to help them understand where they got derailed. In the early weeks of the semester it is important for me as the teacher to be gentle and supportive.

By the third or fourth week, the students were comfortable with me circulating during the beginning of class. They had heard several of my lectures and had seen how I solve problems on the whiteboard. Many students were comfortable enough to answer questions I posed while I was at the whiteboard. So then I started a new conversation as I circulated in the warm-up period at the beginning of class. After I have reviewed someone's work I might say, "Hey, good job on problem #5! Would you be willing to go to board and show the class how to solve it?" Not many were willing, but by then there were one or two students who agreed to do it. So up to the whiteboard we went, and I stood off to the side if the student needed help. The first student wanted to just write the solution on the board and then sit down. But I encouraged the student to explain the steps. And when the student was done, I told the class to applaud the brave student. From that point forward, the class applauds for every student who presents their solutions at the board.

Once one student goes to the board, there are many others who follow. Around week five, I started the warm-ups by writing the problem numbers that I wanted volunteers to solve in front of the class. The students went up to the whiteboard and put their names next to the problems they wanted to solve. Usually they asked me to check their work first because no one wants to make a mistake in

front of the class. But even on the rare occasion when someone did mess up on the whiteboard, we all applaud at the end. We all understand that mistakes are part of the learning process. I certainly make my fair share of mistakes in front of the class, and I welcome the students' observations on what I did wrong.

I kept track of which students volunteered to go to the board and which students did not. I never forced anyone, but if I noticed someone was not volunteering, then I spent more time with that student during the warm-up. I would find a problem that they solved correctly and ask them specifically to do solve that problem on the board. By week seven, every student had solved a problem in front of the class at least once. And I was no longer standing off to the side in the classroom while a student was presenting a solution on the whiteboard. I was sitting at a desk in the middle of the classroom, surrounded by the other students.

## **Promoting Collaborative Learning**

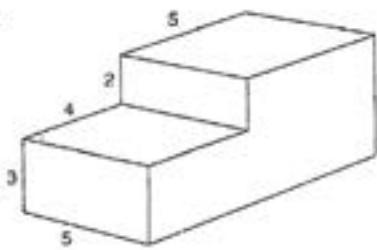
Of course, there is more to facilitations than getting the students to cross that line and present at the whiteboard. Smith (2010) explains that "in collaborative learning the instructor values and builds upon the knowledge, personal experiences, language, strategies and cultures that the learners bring to learning" (p. 149). As the semester progressed, I added activities that got the students working together and used some of the students' life experiences. For example, to introduce the concept of slope for linear equations, I talked about the OSHA requirement for access ramps, which is "no ramp or walkway shall be inclined more than a slope of one (1) vertical to three (3) horizontal" (OSHA, 1926.451(e)(5)(ii)). Many of my students have had jobs in construction and are familiar with OSHA. One of my students, Frank, offered tips and tricks about ladder safety to the whole class when we started talking about OSHA. For the

slope activity, the students were randomly broken into groups and were tasked with measuring various access ramps around the adult school. After each group collected their data and calculated the slopes, we compared them to the OSHA requirement and discussed the formula for the slope of a line. Working together in small groups and allowing students to bring their life experiences into the classroom helps the students work and think collaboratively.

Learning to work together can produce some exciting learning episodes. Late in the spring 2016 semester, I had assigned the following problem out of the Kaplan GED Test 2015 book (p. 397, problem 4) for the geometry unit:

**B. Find the volume of each figure**

4.



Eddie had volunteered at the beginning of class to solve this problem on the whiteboard during the homework review. He split this figure into two rectangular prisms by cutting the shape horizontally, so one rectangular prism ( $5 \times 5 \times 2$ ) was on top and another ( $5 \times 9 \times 3$ ) was on the bottom. When Eddie was done presenting his solution, Monica spoke up and said she had done the problem a different way. She cut the shape vertically so there was a rectangular prism in front ( $5 \times 4 \times 3$ ) and a large cube in the back ( $5 \times 5 \times 5$ ). She asked if her way was easier since she was able to apply the formula for the volume of a cube. I asked her to come to the board and present her solution to the problem and the class would discuss the merits of each methodology. Most students agreed that both approaches required two calculations so both approaches were the same amount of work.

Then a third student, Fabian, spoke up and said he thought of a third way to calculate the volume. He wondered if you could think of the figure as one giant rectangular prism ( $5 \times 9 \times 5$ ) minus a smaller rectangular prism ( $5 \times 4 \times 2$ ). I suggested that he come to the whiteboard and try it out. He was reluctant, but Eddie and Monica offered to help him. So I sat in an empty student desk and watched the three of them work out his idea on the whiteboard. I observed the rest of the class taking notes and using their calculators. The entire class was engaged and curious to see if Fabian's third solution was also valid. While it is tempting as the teacher to make suggestions on how to solve a problem, it is much more valuable and engaging for the learners to work out ideas together and be able to discuss the merits of different methods.

I have been amazed at the test results of my students. For fall 2015, there were 10 students in my class for the entire semester. Six students signed up to take the GED Math test, and all six passed. Ten of my 13 spring 2016 students took the GED Math test, and all ten passed the test. While I am proud of the students for passing the test, but I get the greatest satisfaction as teacher by watching the students step over that invisible line to the whiteboard and seeing them realize that they can do math. And we did it together as a little classroom community. It turns out that it is possible for a GED Math class to use facilitations and collaborative learning. I am as surprised as anyone.

**Final Thoughts and Suggestions for New GED Math Teachers**

- Never give up on a student that appears reluctant to present problems on the whiteboard. One day that student will surprise you by saying yes.
- Be sure to have community classroom agreements in place about being respectful of each other and do not allow teasing. We

can only say positive things in my classroom. The little joke that “Mark” might finally pass the test hurts even if Mark laughs it off. And you might not realize what damage was done until Mark suddenly stops attending.

- Do not underestimate the power of applause after a student has presented to the class. Keep applauding throughout the semester.
- If you stand at the whiteboard and ask if the students have questions, they have no questions. However, if you ask the students to show you the answer on their calculators as you walk around and check, you will get a lot of questions.
- Try something new in your classroom. You might be surprised by the results, but that means you are learning too! ♦

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