

# Productive Failure (#PF)

Posted by Stan Yoshinobu

This spring quarter I taught Math 423, a course for future secondary math teachers. This course is often called a "capstone" course and is intended as an advanced look into the secondary curriculum. It's a hybrid course in that it is a math course, but it also has the goal of transitioning math majors from being a student to being ready to enter a credential program. Put more simply, it's a transition course from being a math student to being a math teacher.

One of the main themes of the course was productive failure. In an earlier post [De-stigmatizing Mistakes](#), I wrote about how Ed Burger makes productive failure part of the course. So I did the same for Math 423! Five percent of the grade was based on sharing productive failure. Students were required to share at least twice during the quarter a mistake that they learned from. These mistakes could be natural or could be intentional (as in a strategy like trial and error).

The results were better than I had anticipated! Students felt as future teachers they needed to learn this lesson about the value of productive failure. They felt a sense that everyone makes mistakes and that we can all learn from them and others can learn from them, if we share our newfound insights. We de-stigmatized mistakes in our little segment of society, and it felt right and good.

One student writes in a portfolio assignment:

*One of the biggest themes that I will carry not only into my teaching career but in my life is the idea of productive failure. Failure is given the stigma of being negative and until I came to this class I believed that. After going through this class my thoughts on failure have completely changed. I never thought of failure as a device that can enhance learning and ideas. Every day, watching everyone present their productive failure I noticed how no matter how small the failure was someone learned something. It not only taught us how not to do something, but the right way to think about certain problems and common misconceptions that can help you better adjust your lessons as a teacher. Failure is a part of life and should be embraced and not chastised. By giving failure in learning such a negative connotation you can inhibit students from good learning habits and for a love of school. I believe that failure should be considered productive and embraced in classrooms all around the world. -- Jordy Adamski, Cal Poly Math Graduate*

Experiences like this are some of the major reasons why I spent so much of my time thinking about improving teaching and improving the system. When it works, it's wonderful! When we say the classes are more fun to teach and students get more out of it, it's hard to communicate the impact. Some might think that the C student moves up to a B, but that captures little of the real transformation that occurs in some the hearts and minds of our students. Changing one's entire outlook on mistakes and how that might impact that student's math teaching practices in the future is a tremendous change!

An important point to mention is that productive failure fits naturally into an IBL framework. Productive failure can easily be included in the course grade, since IBL courses already have the active, student-centered dynamic that can easily accommodate short student presentations on productive failure. On the other hand, a lecture-based course normally does not have the comfort level and student buy-in that would allow students to open up and expose themselves by sharing their latest and greatest mistakes. Hence, it is emphasized that the teaching system used is fundamental and that adding low-cost, high-impact strategies, like productive failure, should be done within a broader framework that supports it.

Throughout the term we used hashtags. We labeled productive failure with #PF, which made class more fun and also elevated productive failure to it's rightful, dignified place in the learning process. #PF showed up all over the place throughout the course, and I hope it finds it way into your classes, too.

#PF!