So, we're back in the classroom… Did we learn anything?

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Ok, around spring break 2020…every one of us was probably in the same position "*you've never taught online before…but your college/university president mandated all instruction to go online – right after break*", does that sound about right? If so, and you were anything like me, then the first few hours/days thereafter total panic filled your lives. But we do what we as teachers always do, we persevere and somehow get through the crisis … no matter how big! I will go through next what I developed for my classes that had been moved online, both for the rest of that traumatic semesters as well as Fall 2020/Spring 2021.

So, once I got past the initial shock that I was mandated to do something I never planned on doing and didn't even know how I'd do it…nor did the mandate seem to care if we could even do it, I said "*now what?*".   I then started to think out my strategy which involved getting my notes scanned in, eliminating certain portions that we would fill-in/annotate during class and post these packets for students to use during this online instruction.   As picky as I tend to be about my own writing…I knew that would take far too long and be far too boring for everyone watching; it would surely put them all to sleep! So, this strategy seemed like a nice work around. Ok, now that I knew my goal…the thought went to "*how am I going to annotate them?*"   I started our using the built-in document share in Zoom and you can annotate right on top of your document. It looked something like this:

I thought that was nice/problem solved…but once I out this into practice, I quickly learned this was not a workable solution. You might wonder "*what was so wrong?*"… I'm glad you asked.

When I actually tried this in my first couple online classes from home after spring break, I learned right away that when you annotate upon one of the pages the writing stays put in the screen even when you scroll the document up/down or side to side…so, unless you cleared the screen of all annotations every time swiped, you'd have all the old markings in the wrong places! Ok, so clearing the screen wasn't so bad but it got worse…much worse! In my testing all seemed fine but once under the load of a full/live online class, it had way too much lag to be used. So, I started asking friends and combing through resources to find a better/workable solution…

I'm sort of upset at myself, because I already had this app and had used it for a while to grade assignments that were turned in electronically (as PDFs) but under the stress of moving everything online immediately…I'll cut myself some slack and say the stress clouded my judgment. The app is called Notability… once I thought of it, and getting over the guilt of not thinking about it first, I placed a PDF inside and began my testing using Zoom and the screen share option. It looked like this:

$$\text{So, } v + x \cdot \frac{dv}{dx} = 1 + 3v + v^2 \quad \text{and} \quad x\,\frac{dy}{dx} = 1 + 2v + v^2$$
$$-v \qquad\qquad -v \qquad\qquad = (v+1)^2$$

$$\therefore \frac{1}{(v+1)^2}\,dv = \frac{1}{x}\,dx \quad\Rightarrow\quad \int \frac{1}{(v+1)^2}\,dv = \ln|x| + c$$

$$\text{let } u = v+1 \qquad \int \frac{1}{u^2}\,du = \ln|x| + c \quad \text{and}\dots \quad \frac{-1}{v+1} = \ln|x| + c$$
$$du = dv \qquad \frac{u^{-1}}{-1} = \ln|x| + c$$

$$\therefore \frac{-1}{\left(\frac{y}{x}\right)+1} = \ln|x| + c \quad (\text{General Implicit})$$

$$y(1) = 0 \Rightarrow -1 = \frac{-1}{\left(\frac{0}{1}\right)+1} = \ln|1| + c \quad \text{and so, } c = -1$$

$$\therefore \text{ particular solution :} \quad \boxed{\frac{-1}{\left(\frac{y}{x}\right)+1} = \ln|x| - 1}$$

Def^n: A first-order differential equation that can be written in the form

$$\boxed{\frac{dy}{dx} + P(x)y = Q(x) \cdot y^n}, \text{ where } P(x) \,\&\, Q(x) \text{ are continuous on } (a,b) \text{ and } n \in \mathbb{R},$$

is called a Bernoulli Equation

It looks very similar to the built-in feature of the Zoom app…but with none of the lag and no issues with the annotations staying with the page as I'd scroll up/down. I was eager to try this for my next online class, and the students who'd been so patient with the chaos we encountered using the Zoom method were even wanting me to do a "*live trial*". So, I did just that during my online class and they loved the difference…said it was so much better, etc. My only issues were that I couldn't see them/they couldn't see me…and I couldn't see the chat room; which was bad, because many of my students preferred to type chat comments rather than open their mic. How did I solve this? I used a two iPad setup, and one was for capturing my audio/video as well as displaying the chat board…my other iPad also logged into Zoom, and sharing the screen in that

app I then switched to Notability and annotated as before. It seemed like a very workable solution and one I actual used for the remainder of my time teaching remotely; which unforeseen to me at that time, stretched through Fall 2020 and Spring 2021.

Ok, that's out of the way…what else did I do? Well, I of course moved all assignments/quizzes and exams totally online. For some lower level courses, this was pretty easily done using Pearson's Testgen software and uploading the correct format to Blackboard. I used this same technique to provide sample exams for the students as well, but the grade on these wasn't reported to me and didn't impact their course grades. For upper level coursework, I posted quizzes as PDFs on our Blackboard…graded/annotated them with Notability, then sent them back electronically to the students. I think they loved this quick turnaround and that I would also post the full annotated quiz solutions on Blackboard that they could consult if they had done poorly on part/all of a given quiz.   I did similar with their exams, and I'd have the exam PDF go live on Bb at a certain time and I gave them a bit more turnaround time to get everything in since they had the process of scanning their pages/uploading and sending me their PDF documents.

I even came up with what I thought was a nice solution for comments/questions that normally students could just drop by my office and ask…. I would first start by trying to answer through email itself, but if it was fairly sophisticated this might not work. I then went to draw on a blank document/page in Notability, exporting as a PDF and sharing with the student electronically. If this was still not getting the point across, I'd do a short video using Zoom and screen share with Notability and once recording to the cloud I would send the link to my student. This turned out to be a nice way of sharing a solution with the entire class, by also posting the video to our Blackboard announcements section. I didn't start out with all of these steps from the beginning, there were "*bumps in the road*"…like the fiasco with Zoom/annotating I described earlier, but filled in the gaps an enhanced as I progressed through my next two semesters of teaching online from home.

Ok, once I knew I'd be back in the classroom for FTF classes this past Fall 2021…I started asking myself "*So, we're back in the classroom…Did we learn anything?*". I received some of my best feedback and best student evaluation comments of my career during this time, and it wasn't for free, nor by accident…I'd worked my tail off trying to make it as rewarding of an experience online as it would've been in a FTF setting. So, I thought there must be things I could carry over and still accomplish in a live classroom, *but what…and how*? I quickly made a checklist in my mind of things I wanted to keep:

- I wanted to continue using my skeleton note system (as well as annotating on them using Notability) in a live setting.
- All homework/quizzes would be done online…no paper exchanging hands, just like when I was teaching remotely. I'd have never known how to do all this before but definitely something I could put into action for my FTF classes. Yes, this also included exams…either totally through the Blackboard interface (using uploaded exams created in the Pearson Testgen environment) or posted exam PDFs that would "*go live*" at a preset time.
- I also continued to offer sample exams, especially for my lower level courses, online to serve as a great study tool near the end of the studying…for immediate feedback!

- I wanted to record every class meeting and post to Blackboard…I heard too many positive comments about how helpful they were, for a variety of reasons, I didn't want to abandon this at all!
- I also continued to have my "*tiered feedback system*" even though I was required to hold FTF office hours…I just said to my students that instead of having to be physically in my office or even on campus, every office hour would be virtual (like provided on our Blackboard) and for them to just email me if they were needing that level of help and I'd admit them as soon as I'd helped anyone before them.

Seems like a pretty lofty set of goals I had going back for my first FTF teaching in almost 1.5 years…but I was determined to get the most good I possibly could out of my hard work/learning during this time of remote teaching. You might wonder "*this sounds great, but did you get a special classroom for every course when returning FTF…or how did you record your live classes?*" Great question… in my college we have only one dedicated "*Zoom Room*" but every classroom is equipped with a PC/Elmo and ceiling-mounted projection system. I didn't really wanted to use the room PC to start up a Zoom session/join with my iPad and project to the class that way…not just for "safety concerns" (not knowing when or how the keyboard might've last been cleaned, etc.) but more that I didn't want to experience any lag in what I was doing and what they'd see on the classroom screen. So, I purchased a dongle for my iPad Pro which let me directly connect to the room's projection system…so no extra lag, and I didn't have to mess with the in-room PC! I tested this before fall classes began, just to make sure what displayed in the classroom was also being recorded by Zoom and that talking at a normal level would work for playback. I was convinced it should be fine, so I proceeded "*full steam ahead*" and it would allow me to continue recording/posting all live classes on Blackboard as I'd done for the past 1.5 years…Yes!

Now that the last piece of my puzzle seemed in place…granted, just days before the semester began (I'm leaving aside my tremendously stressful realization that my newer iPad Pro had a USB-C connector…so I had to scurry around and get a new Apple dongle only a day or two before my semester began!) it was time to begin the semester and put everything I'd learned and planned for into action… it actually worked much more smoothly than I might've even expected and had some tremendous benefits along the way. Some of these benefits included:

- I wasn't sure how FTF students would like this, but they've really enjoyed the freedom of getting to pick their own test environment and even "*staying home in their PJs, snuggled with a blanket, to take their exams*"
- Posting all live classroom discussions on Blackboard had the benefits of resources that could be reviewed for homework/quizzes/exams or even the final exam as I'd thought…but a couple of extra benefits were:

  o Students away on NSU approved absences, like traveling with a sports teams, a scholastic competition or even an approved field trip, didn't have to scurry around trying to find notes of someone who might've been to FTF class (as they would've had to do in times past) but could just pull up the Zoom recording, that I'd post as soon as possible after class ended, on almost any device and even watch along as they filled in my skeleton notes.

  o Students who were exposed to Covid, or actually tested positive, and needed to quarantine didn't have to worry about 1-2 weeks missed of valuable course instruction…they could easily keep up with things remotely.

  o And even students who were sick, but probably not Covid, I would just urge them "*better to be safe than sorry*" and just stay home until they felt better…they could always keep up with the skeleton notes and posted videos.

- Using my skeleton notes/annotated using the Notability app turned out to also have some nice benefits as well:

  o Since I had much of my content already in the skeleton notes, I found myself not look away from the class for most of the day writing on the board…but I could make much more eye contact, get that live feedback/interaction and truly feel like we were having "*class discussions*" instead of me lecturing to/at them.

  o Before all of this, if someone in the 7th row couldn't quite see what I'd written…there wasn't much I could do, since you can only write so big while trying to make efficient use of your board space. But now I can "*zoom and enhance*", and make something bigger upon request or … even when I just get a feeling something might need a closer look, I can pinch to zoom in very easily.

  o In the past I would be hesitant to bring in outside technologies, like a calculator (or even something that would graph 3D surfaces for a class like Calculus 3)…just for the extra setup time it would take with the room PC and projection system. But since I was using my iPad and projection system everyday anyway… I now routinely bring in some of these tools "*from the side*", and it looks like this:
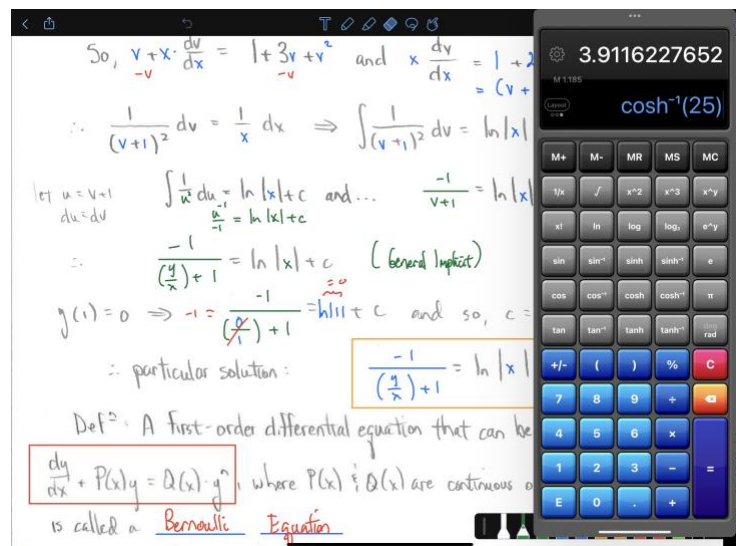
  o It provided me more colors than I could ever want (and I do like using my colors!) and lots of drawing tools/styles but also recognized shapes (to make very professional-looking circles/lines/triangles/etc.) or even draw a nice box around a finished solution or to have a special substitution or idea "*stand out*".

Aside from all of these wonderful benefits I observed from bringing these techniques I'd learned during my 1.5 years of teaching remotely from home into my FTF classroom… One of the biggest things things to me was not needing to use chalk during class discussions! I used to get all that chalk dust on my hands/clothes…and even my face, it would get pretty bad at times but anything for our students, right? I'd even routinely have a student say "*Dr. D…you've got chalk dust on your face*".   I'd just respond that "*I knew, and I'd wash it off later…happens all the time*". But not any longer, it's almost "*liberating*" in a way, and I doubt I'd ever go back to my old/traditional style of delivering material on a chalkboard ever again! Wow…In all my years since graduate school, I never thought I'd even come close to saying those words!

I hope you enjoyed this journey through the formation of my "*work flow*" developed from teaching remotely after the pandemic hit, and how I carried much of these ideas into my FTF classes this academic year. You may have developed a totally different system that you might've carried back into your FTF class (and that's great!) or this paper might've given you the courage to try those techniques back in a live setting…or inspired you to try adopting some of mine. Whatever the case, I hope this has inspired you that even in disaster…sometimes good things can rise from the ashes!