

Fall 2016 GTA@OIT Grant Final Reflection

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Group Activities in Online Basic Calculus

My GTA@OIT Grant, *Group Activities in Online Basic Calculus*, aimed at assisting Malissa Peery in her course redesign of Math 125: Basic Calculus into an online course. The goal of the online course was to allow students to continue to work in groups like their counterparts in a traditional Basic Calculus course. My role in the course redesign was to help determine the best way to use online services to structure the online components. I was able to successfully complete my grant by creating a video lesson on how to use Equatio in Google Documents as well as converting three in-class group activities.

Over the course of the semester, Malissa Peery and I decided that Google Apps for Education would be the most efficient medium to use in order to teach her online Math 125: Basic Calculus course. In doing so, we learned how to use Google Classroom, Google Documents, Google Sheets, and Google Forms – Quiz Feature, as well as many add-ons, including g(Math), Equatio, and Flubaroo.

My first component was a video lesson, entitled *Using Equatio in Google Docs*, and teaches students how to use Equatio, a Google Add-On, to type mathematics. The lesson was created using Camtasia and utilizes a Google Document that students have access to so they may follow along while watching the video. In addition, a follow-up quiz was created to ensure that students watched the lesson and are able to type the mathematics necessary for their online course.

The three group activities that I converted into online assignments all required either tangible or paper-based components. When creating the online versions, I kept in mind that students would have the opportunity to work in Zoom breakout rooms, maintaining a similar atmosphere to the traditional classroom. However, I needed to find accommodations for the assignments that would not carry over to an online course, such as being able to show work.

The first in-class activity that I converted was P & Q Rules Card Activity. For the traditional course, students are required to manipulate tangible cards containing mathematical expressions to practice the product and quotient rules for derivatives. I created a comparable activity using Google Documents in which students copy and paste “virtual” cards over blank spaces. Students appreciated this formatting because it was simple to use and did not require much typing.

My second project was to convert Product, Quotient, and Chain Combos, currently a paper-based activity, into a scaffolded assignment. In doing so, I updated the previous activity, which included three challenging derivative combination problems to problems with intermediate steps. The former version of this assignment typically requires much assistance from the instructor. For an online course, we wanted it to be easier to determine exactly where students are struggling and help guide them in their process of working through the problems. Students appreciated the scaffolding as it gave them more direction in what we were looking for

when grading their assignment. One student said, “It was easier to type since it only asked for the individual pieces, not just "show all your work.””

While creating this Google Document, I considered three different methods for students to type their mathematics: Insert Equation, g(Math), and Equatio. All three options were tested with my Spring 2017 students. The first, Insert Equation, is a part of the Google Documents services, similar to the one found in Microsoft Word. Students insert a math box and type inside without many formatting capabilities. The second, g(Math), is a Google Add-On that must be downloaded, but provides students more options of formatting, including being able to type using TeX code. These first two options both had their disadvantages. The Insert Equation choice did not give pre-typed math for students to select and alter. g(Math)’s editing box was too small for some of our problems as it did not have a scroll bar when you reached the end of the screen. Equatio is a Google Add-On intended as an updated version of g(Math). It fixed the problems that we faced with the small equation editor while still allowed for formatting. Equatio is the add-on that will be utilized primarily for the online course.

My final component was a Google Form in the quiz format that allowed us to collect information from students regarding their work from finding the area between curves. The original idea for this assignment was to have students graph two functions on the computer and then continue with the calculus in order to find the area between the two curves. Throughout the course of the semester, we realized that it was more beneficial and time-efficient for students to graph by hand and then report their work. In the two prior components, students responded that it was easier for them to work on paper and that they would prefer it. Students expressed that typing out their work was “time-consuming and irritating”. While typing during an online math course is to be expected, we determined that there are certain assignments in which we can avoid student irritation. Students shared their relief with this Google Form assignment saying, “I liked this format much better than in the past. [...] I liked the clicker format of solving the worksheet on paper and then entering in my answers in a multiple choice version. Plugging in full equations at the beginning of the semester was much more time consuming and tedious, and I feel like it would be much easier to have multiple choice versions.” For this reason, the online course will have a balance between Google Documents- and Google Forms-formatted activities.

I am very excited to share that this online Basic Calculus course will go live this summer. All of my materials were tested in a computer lab with my students during the Spring 2017 semester. I was able to walk around the classroom to see if the components were working as intended and updated the components as necessary.

***Quotations come from student comments collected via Google Forms. Not all comments were included.