

Review of *Desmos Classroom Activities*

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In my role as a staff developer in the CUNY Adult Literacy Program in New York City, I support math teachers with curriculum and coaching and teach a weekly math class. In March 2020, I was teaching a class when we switched to online because of the COVID pandemic. Since then, I have been searching for a combination of instructional tools for remote math instruction that would allow for a problem-solving approach to teaching math based on group work. The most useful tool I have found so far is the Classroom Activities tool on Desmos.com.

Desmos offers a range of tools for learning math, including graphing and scientific calculators (also available as free smartphone apps) and a geometry tool for constructing lines, polygons, and circles. Most of these tools allow for saving and sharing the work teachers create through a free Desmos account, which is accessible through a Google login. For example, I have saved almost 300 graphs in the Desmos Graphing Calculator. These tools can be used independently and are available in the Desmos Classroom Activities teaching and learning application.

Evaluation

Desmos activities incorporate each of the functions needed for a problem-solving classroom: displaying mathematical information,

facilitating interaction with math tasks, and allowing for substantive interaction between students and teachers. Desmos also promotes a problem-solving approach and tools for exploration and discovery while learning math. In short, it solves the technical problem I was having but also provides a richness of activities and tools for instructional design that were previously outside of my experience.

The Classroom Activities are available as completed sequences created by other teachers or Desmos staff in featured collections by grade level and math content which work well for pre-HSE and HSE level instruction. Teachers can copy and modify existing activity sequences, create a sequence from scratch, or copy individual screens into their activities to develop their own sequences.

Desmos activities have given me the ability to display mathematical information for my students to consider and respond to. They allow me to create interactive screens with the following elements: notes for students, uploaded images, tables of data, and graphs. I can create opportunities for students' responses with text input boxes, multiple-choice answers, input into a data table, and interaction with a graph and coordinate plane. I can even allow students to sketch their ideas on a blank canvas, an uploaded image, or graph. For example, I have used this option to ask

■ Desmos, *Desmos Classroom Activities*, <https://teacher.desmos.com>.

students to make predictions about the graph of an equation. They might plot points or draw a line on one screen and then consider the completed graph of an equation on the next screen.

Beyond this ability to display and collect information, Desmos allows students to interact with each other's ideas. When designing a screen, teachers have the option to share students' responses with their classmates. A teacher might display a graph of data, say, the price of bread and the federal minimum wage since 1930, and ask students what they notice. After typing their response, they will see responses from their classmates. They can also see other students' responses to a different answer type, such as a multiple-choice question.

In my class, the ease of student input into Desmos screens has helped us interact with each other's ideas. Generally, students do this by sharing screens and looking at each other's work. Since everyone has their work in the same online place (as opposed to a notebook, a Google Doc, an annotated PDF, etc.), students learn the routine of opening the Desmos activity and showing their work to each other. Once everyone learns how to share screens (not necessarily easy for everyone!), students can work collaboratively to make sense of the mathematics through conversation and demonstration. I can't say enough about the power of students teaching each other by sketching, showing calculations with the embedded calculator, reasoning with a data table, and graphing points.

After assigning a Desmos activity, teachers also have access to a powerful teacher dashboard where students' real-time responses can be tracked during a class or in between classes for homework. Teachers can observe where individual students are in activities and see their responses as they

occur. There is no need for students to save or submit work, which simplifies the experience for students and allows teachers to give feedback immediately. For example, during a recent assignment, one of my students completed a data table that automatically plotted points on an accompanying graph. I was able to post a feedback note where I commented that some of the points weren't in the same line as the other points. I wondered if the student had noticed this and why that might be true. When I returned to the dashboard the next day, the student had corrected the data table. This response to feedback would take days or weeks if homework had to be submitted, corrected, and returned, missing the moment when the feedback would be most useful.

In my experience, one of the best things about Desmos is how easy it has been for my students to learn. I create a share link for each weekly activity and post it in Google Classroom, though the link could easily be shared through email or in a Zoom chat. After clicking on the link, students can enter with a Google login and begin the activity immediately. They can return at any time with the same link and continue working or see my feedback on their work. Desmos is integrated with Google Classroom, so my class list of students is synced automatically, but Desmos Activities can also be used independently.

Recommendations

I believe the Desmos Classroom Activities tool could be used broadly in adult education, and not just in math instruction. The activities can be created from scratch and allow for displaying of text and images, with text, multiple choice, and drawing responses. These are tools that would be useful in a reading/writing or ESOL class. Text could be posted as a note. A screenshot of a short poem could be uploaded as an image, allowing

students to highlight and annotate. Screens with practice test questions could be created with multiple-choice answers. The teacher dashboard enables teachers to see their students' responses and share them with the class.

However, because Desmos is built for math instruction and collects so many well-designed lessons, it is probably most useful for math instructors in adult literacy. Though the technology is incredibly powerful, Desmos has

probably helped me most by connecting me to innovative teaching in K-12 which uses an exploratory, discovery-based approach to math instruction that allows for curiosity, predictions, and conjecture using interactive tools. I have just started to learn about the possibilities of this new form of teaching. Even though we hope to return to our physical classrooms soon, I will continue to integrate Desmos into my instruction, including in-person instruction.