

Math: Online Interaction

Qi Guo, Whitney Keaton, Michelle Jensen, & Cecil R. Short

Review foundational knowledge about [Online Interaction](#) in K-12 Blended Teaching (Volume 1).



7.1 Online Interaction in Math

Math classrooms can thrive on interactions with and between students. Both in-person and online interactions and feedback provide students with ways to share and support their insights, give and receive feedback, and present both written and oral opinions and positions on math inference in a polite and evidence-based manner.

Teachers Talk: Using Discussions to Practice Math Language



Rachel Peterson

In math, it's important for students to express their ideas using correct terminology and vocabulary. They don't get an opportunity to do that very much. When it's spoken, we tend to let them get away with saying things incorrectly or we correct it for them. But when it's written and it's permanent and you can see it, they tend to edit more. They think, "I'm writing this, I'd better make sure it sounds good and I'm using the right words." If you want to try something, a discussion board is a really good and easy place to start. Perhaps in the last 10 minutes of class, you ask students to answer a discussion and respond.

7.2 Student to Student Interactions

Teachers Talk: Using Online Discussions to Increase Participation and Build Relationships (3:42)

Reflection Questions: How can you use online discussions to enhance students' participation and interaction?

Manipulating, observing, exploring, measuring, calculating, analyzing, and inferencing are at the heart of math classes. Conversations around these activities can help students to build critical thinking skills, express themselves, listen and civilly respond, and revise their opinions or understanding when needed.

There are many technologies that support online discussions. Here are a few of them and how they can be used in math. (You might want to become proficient with one technology before branching out to another one. Don't try too many at once.)

- Discussion Boards: Usually part of a learning management system (LMS), they allow threaded discussions that can be tracked, reviewed, and tied to the grade book.
- [Padlet](#): An online bulletin board where students can post and reply to comments using text, images, audio, and video. Students can also create timelines, storyboards, and collages individually or collaboratively. This tool can be great for sharing procedures or projects.
- [Flipgrid](#): a video discussion board. Instead of using a text-based discussion, Flipgrid allows students to post and respond with video, which can increase social presence for the class (the sense of nearness and community within the discussion). Flipgrid also allows students and teachers to create and share screencast videos. Again, this can be great for sharing procedures and processes, and even responding with videos of revised or alternate processes.
- [GoReact](#): Another video tool that allows students to submit videos of themselves for observation and feedback. This can be useful for helping students create, evaluate, and receive feedback on their presentation or oral skills.
- [VoiceThread](#): A video/audio tool that allows students to add pictures or text to a project, give feedback on ideas, and explain their work. It can also be used to make instructional videos with interactive abilities (that can also be turned into quizzes), and create situations where students think aloud about their analytical processes and share their videos with each other.
- [Google Docs](#): A collaboration tool, where students can write and receive feedback and suggested edits on what they've written and where students can collaborate on projects.
- [Google Slides](#): Similar to Google Docs, Google Slides allow students to individually or collaboratively create presentation slides. Google Slides is also increasingly used to generate quick ideas and brainstorm, with each student or group of students having one slide. This can be a great way to introduce problem or project-based learning into a lesson. Students can create a slide showing their ideas for solving a problem, then students can work together in a group combining their slides to come up with the best or most popular method.

Just like in-person discussions and interactions, online interactions can become stale if they do not include variety and contrast, inviting students to think deeply and/or creatively.

Here are some ideas that are relevant to a math classroom. Note that some of these discussions start in the online space and end in person, some start in person and end online, and some may even bounce back and forth between the two modalities.

Table 1

Online Discussion Ideas

	In-person	Online
Introduce new concepts/theorems/formulas etc.	<p>2. In a full class explanation (with video backup) explain the new concept.</p> <p>3. In different stations, have objectives, pencil and paper, and graphs available for students to manipulate, draw, observe or compare.</p> <p>4. Ask students how they visualized or organized their thinking. Ask if they had a preferred method for thinking through the new concepts.</p> <p>5. Ask students to reflect on the important information/quantities/numbers in the problem?</p> <p>6. Have students post videos of their manipulations and explain their rationale as a new response to their initial discussion board post.</p>	<p>1. In an online discussion have students write an equation or equations to represent a problem or situation requiring the new concept. What math tools or models do the students think can be used to solve the problem?</p> <p>7. Let students review others' responses, and ask them, do your peers' equation/approach make sense to you? Is there another equation/approach available? Which model/approach is more efficient and effective to solve this problem—their initial attempt or their revised attempt?</p>
Review concepts/theorems/formulas	<p>1. In person review the concepts/theorems/formulas students just learned, and ask students if one value is changed in this problem, how this could affect the situation and solution?</p> <p>2. Demonstrate to students either in person or online some other ways to solve the problem.</p>	<p>3. In an online discussion board, post a similar question to each group, and have students write their solution as the first post.</p> <p>4. As a second post, have students review others' first responses, and have students consider responses such as the following: Does your peer's solution make sense to you? Do these different solutions express the same or different ideas? Explain any connections to your original post. Can such different solutions both be correct? If you think your peer's solution is wrong, why do you think this solution is wrong?</p>

	In-person	Online
Apply the concepts/theorems/formulas	1. Review the concepts/theorems/formulas again and ask students to come up with a similar problem as they have solved previously.	2. Ask students to write their problem in a discussion board as the first post. 3. Assign students to solve another peer's problem within their group. 4. Have the student who provided the initial post grade their peer's solution. Was their peer's solution and process what they expected? If not, what was expected? If it was to be expected, were there any other ways to solve the problem?
Observe, predict and summarize math patterns	2. In person have students meet in a group different than the one they will communicate with online to compare: What patterns they saw in the given set of data? What those patterns might tell them? Whether they think they can reasonably predict what additional data might suggest? 5. Let the students reply their peer's assessment and summarize by answering, is there a summary or shorthand way of expressing these recurring patterns?	1. Provide a data set online that is accessible to all students. After a few minutes of reviewing the data set give students a brief amount of time to record their initial impressions in an online discussion. 3. In the discussion board have students write their predictions. Did they get these by counting or calculating? 4. Review their peer's predictions and assess them by answering if they are correct in all cases? If yes, why do they always work? If not, why? And do you have a question for their peer group?
Identify common mistakes	4. In person, use the data gathered from looking at student responses in the online discussion to create small groups for review or facilitate a whole-class review of misconceptions or problematic misunderstandings.	1. Show students some problems that commonly have mistakes or that can be solved in a better way than what students commonly attempt. 2. In the online interaction, have students identify the mistakes in the problems or brainstorm better methods. 3. Ask students to respond to their peers' ideas relating them to their own.

[The Big List of Class Discussion Strategies](#), compiled by Jennifer Gonzalez, is a longer list of ideas that could be adapted for online mathematical interactions, including Socratic seminars, gallery walks, affinity mapping, etc.

Teachers Talk: Discuss Ideas Online and Validation



Rachel Peterson

I really love having students discuss an idea online. They make a conjecture and then respond to other people. It's like, "Oh, I didn't think of that." or, "I don't agree with you because of this." and then they're arguing, but in a constructive way in the discussions. It's really great to read because some of them were right on and some of them were almost there and some of them weren't there at all. Then other students will tell them, and say, "oh yeah, you're right because if I do this..." They're exploring and testing each other's theories until they come to a consensus.

One of the features I really like in the math learning tool Desmos is that it will show students others' answers because students always want that validation, such as "Was I right?" "Am I thinking what others are thinking?" "Am I the only one thinking this?"

An online discussion is most effective when the expectations and instructions are clear. For a review of how to create an effective online discussion prompt, see 5.2.2 [Building Community and Setting Expectations](#) and 5.3 [Designing and Managing Online Discussions](#) in *K-12 Blended Teaching (Volume 1)*.



Blended Teaching Workbook

In your Blended Teaching Workbook create an online discussion for the lesson/content area that you are addressing with your problem of practice. How will you make it engaging for the students? How will you target your problem of practice?

If you haven't already opened and saved your workbook, you can access it [here](#).

Not all online interaction has to take place in a discussion. It can take place in a shared Google Doc, in a real-time Zoom meeting, through blogs or social media, through visits to each other's websites, etc. Below are some examples of online interactions that do not require the use of the online discussion format.

- Students could share their favorite mathematician stories on a class or course web page, including a summary of the biography of the mathematician, what they have discovered or contributed in the math world, how we can apply it in a real-world context, and what they liked about the mathematician or were impressed by him/her. They could post some texts, pictures, or videos they collected. You might have a day to let them present their favorite mathematician stories.
- Create a page for students to contribute to a collection of their common math mistakes in a Google Sheet. Have them write the questions, the correct answer, and the correct steps for solving the problem. They could also include their wrong answers or steps, and what caused their made mistakes. This could create a great crowd-sourced resource for studying!
- Create an "I found" page for students to explore math phenomena in the real-world, daily life, or nature. Students could take pictures of their collection and connect the objects they found with the math concepts or patterns, such as Fibonacci sequence and the stamen of daisy and pine corn thread. Students can then defend what makes their finds unique. This information can be recorded in a class blog or open education textbook. In class, students can display and describe their collections. This could be used to introduce future classes and engage future students.
- Have students look for or create some math games that can be used for review and share them in a Google Doc. Each student can come up with a game, write the rules, and what math skills can be strengthened by playing the game. In class, those who complete their coursework early could take turns playing a game in this gallery. The student who came up with the game that classmates decided to play could lead the group of students or the whole class (depending on how many people are required in the game) in playing that game.

Teachers Talk: Power of Peer Interactions



Sandy Chalke

One of the challenges is that some students don't like to talk. But when I give them an opportunity such as a discussion board, they wouldn't be quiet.

Another thing I love about blended teaching is that it opens up opportunity for student ownership. I can have the ones with higher ability help me and become tutors for kids who need support. And that makes review or tutoring more manageable for me.



7.3 Teacher to Student Interactions

Teachers Talk: Using Online Interactions to Support and Build Relationships with Students (3:37)

Reflection Questions: Mrs. Stuart talks about three kinds of interactions. What are they and how could they benefit your classroom?

Interactions between students and the teacher are also important in a math class. Experienced blended teachers often report that their interactions with students online have strengthened relationships and contributed to student growth. Below are some ways that teachers can foster these interactions.

- Participate in online discussions. You don't have to chime in and respond to everyone's posts. Instead your role in a discussion board is to guide and facilitate the discussion. You can monitor what is said for civility as well as content. If a discussion is going in a nonproductive direction, you can gently guide it back. You can respond honestly to good ideas and interesting insights. You can suggest further resources.
- Provide feedback. Students appreciate and need feedback. Teachers find that giving some types of feedback online is much easier than feedback with traditional paper and pen.
 - Give feedback on assignments through the LMS you use. Check out the ways your LMS allows you to communicate with students about their assignments. If you are using rubrics for grading a project, you can give very specific feedback then allow your students to improve the assignment. Your LMS may have additional ways to contact students.
 - Use written, audio, or video feedback. Some students prefer written feedback because they can access it easily; others prefer audio or visual because it's easier for them to understand and feels more personable. There are also times when it's easier to provide audio or video feedback compared to typing out feedback comments. For instance, it can be easier to correct a misunderstanding or provide a process in video with a visual reference or guide. Tools such as [Mote](#) (a Chrome extension that allows teachers to quickly add audio recordings to Google Documents and Google Classroom grade book) can transform traditionally written feedback into audio feedback. There are also several free screen-recording tools that allow you to create quick video recordings and then share them with students using an unlisted link. There are different times when text, audio, or video feedback may be effective and you may try to use all three throughout the year.
 - Traditionally when students are working in the classroom, teachers walk around to provide feedback, check progress, and promote on-task behavior. When students are working online during class, you can still walk around the classroom, answering questions and giving verbal feedback as needed. However, you can also monitor student activity using online software and you can communicate with students using the online space to avoid awkward confrontations or prevent them from feeling called out for their misunderstandings.
 - Schedule one-on-one meetings with students to discuss their progress and provide feedback. The online space can be a reference point for such meetings, providing valuable data sources to guide the conversation.
 - Some online systems and tools, Google Docs, for example, allow you to monitor students' behavior or progress when working. You may be able to pull up as many documents or progress tabs as your computer will allow and give real-time feedback as they are writing. Students are more likely to revise their work when they receive feedback during the process of completing their assignments.
 - In your feedback, share personal examples related to their progress or misunderstandings. Let them get to know you as you work to help them learn about complex ideas.
- Explain to students your process for receiving emails from class members. Encourage them to email you with questions. Explain when you will be available to look at emails, and answer them as promptly as possible.
- Email students who are not in class, letting them know that they were missed and how they can access valuable learning materials.

Teachers Talk: Many Ways to Interact with Students



Mikki Stuart

There are so many ways I can communicate with students online. With Canvas I can email students after a quiz to send a quick message to them. I have the option to email the students that have taken it and those that haven't. "Hey guys, you've got to get this taken by this time. If you need any help, reach out to me. I'm here for you." When I communicate with students online they aren't as afraid as when they are surrounded by peers in a classroom. There is more anonymity for them and it's safer. My students think, "Oh, Mrs. Stuart is following me and cares!"

Discussions are nice because I can reply right away to a student when I see a misconception. I can read through each one and I can see, "Oh, this one's a little off. Think about this." Or I can reply, "Yeah, great thinking!" Just being able to give that response to them individually has been really fun.

I've also utilized Canvas announcements. It's been really nice because some things have been math related and instructional but some have just been to connect with the students. I started doing Google forms and surveys asking things like, "What's your favorite activity?"

Teachers Talk: Follow up with More Students



Rachel Peterson

The students that I think the most about, and come to mind first, are those students that are blenders in the classroom. They're not the loud one or the misbehaving one. They're the students that don't ever say anything and do their own things but wouldn't tell me if they didn't understand something, and I wouldn't necessarily notice because there are so many of them. But online, all of a sudden, everyone becomes equal. So then I can see when a student has a misperception that I can address, where I probably wouldn't have noticed before. Even if they're not reaching out to me, I can reach out and give them individual feedback.

I can think of several students where that's the case. They did something or said something or had some sort of misperception that I would not have noticed, otherwise. Sometimes someone used to do something for quite a while incorrectly, and I didn't notice. Or they have one little thing that's not correct, but if they fix that thing then everything else is fine, but they feel frustrated and stuck way back here when they're really not. It's easier to see evidence if that's online.

The online space significantly increases opportunities for interaction between students and content, students and other students, and students and teachers. Students who never or rarely speak in class may find themselves suddenly communicating on a regular basis. The results of learning through a combination of content interactions, instructional interactions, and feedback can improve student outcomes, investment, and engagement with the subject matter. You don't have to start all at once. Just choose one interaction that looks promising to you—and begin.

Previous Citation(s)

Guo, Q., Keaton, W., Jensen, M. A., & Short, C. R. (2022). Math: Online Interaction. In C. R. Graham, J. Borup, M. A. Jensen, K. T. Arnesen, & C. R. Short (Eds.), *K-12 Blended Teaching (Vol 2): A Guide to Practice Within the Disciplines*, Vol. 2. EdTech Books. <https://edtechbooks.org/-uGaZ>



This content is provided to you freely by EdTech Books.

Access it online or download it at https://edtechbooks.org/k12blended_math/math_olint.