

Math: Online Integration & Management

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

6.1 Online Integration and Management in Math

Online integration is at the very heart of blended teaching. It has to do with how you combine your in-person math classroom with online activities. (Remember the baker mixing dry and wet ingredients from [Chapter 1](#).) Because the main component of blended learning is integrating online and in-person activities, online integration is a good place to begin thinking about blending your classroom.

This is where you, as a math teacher, begin to think about what specific online practices can help you address the problems of practice you identified in Chapter 5. The more examples of blended teaching you have personally seen and the more experience you have with online teaching, the easier this process will be for you. But even if you are just starting out, you will probably have a few ideas of your own. This chapter will help you explore these ideas and more.

Before you start, consider this advice from experienced blended teachers—think big but start small. Small beginnings allow you to scaffold your own process, focus on specific pedagogies and activities, see the benefits and drawbacks, and make improvements on a small scale without becoming overwhelmed by the process.

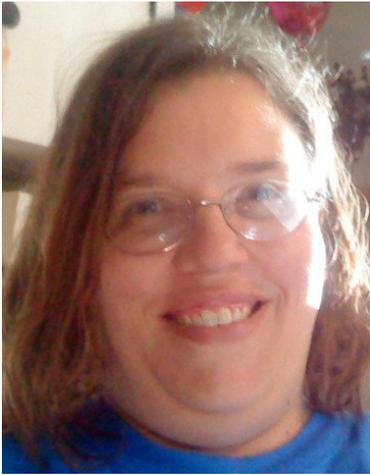
Teachers Talk: Managing a Blended Learning Math Class



Mikki Stuart

I think classroom management partially comes from creating a culture or environment where discovery is encouraged and wanted. I want students to know this is the way our class environment is going to be. Everyone shares. Every idea is valid. But creating that culture is one of the biggest challenges and one of the most important things.

Teachers Talk: Using Flexible Groups



Dawn Schlink

When you're doing blended learning and you're wanting kids to work in groups, it really means a lot of flexibility. I can't always put these four kids together because sometimes these four kids may be really good with algebra, but maybe not with geometry. You have to constantly be able to move kids around. This also means that you really need to know their names very quickly because it's not like you're using your seating chart.

Teachers Talk: Changing It Up



Rachel Peterson

I've taught a lot of co-taught classes—a lot of students with special education services. Breaking up your time segments in a class is super important, and doing something different that's hands-on is super important. I think it's good to just change it up a little bit. When I first started being brave enough to try things, it was for engagement. It's not something they expect that they'll be doing in math class, so they're super excited about it.

6.2 Planning for Integration

You can take that first small step by doing the following:

1. Identify the problem of practice and the learning objective that you are interested in blending.
2. Think about activities, both in-person and online, that could support student learning. (A framework for this process is to think about activities that involve students interacting independently with content, activities that involve students interacting primarily with each other, and activities that might involve interaction with an instructor.)
3. Consider how the online activities and the in-person activities can connect.
4. Choose one of the activities you have considered and create a blended lesson.

In the examples below, Mikki Stuart and Rachel Peterson discuss how they decide what activities to have students do online.

Teachers Talk: Selecting Online Activities



Mikki Stuart

Sometimes we want something that is more task based, that is going to get them to think and maybe come to conclusions that we just don't want to tell. I could stand up and teach a five-minute lesson on exponents and cover everything, but it's just not going to stick. We want those things that are going to let them explore and come to that learning on their own. Then there are times when we just post a very direct instruction video, "Okay, if you didn't get it, here's another thing. Watch it again. See if it clicks. You can watch it as many times as you need to." Other times we want the online activity to solidify the knowledge, instead of discovering it.

Teachers Talk: Combining Online Activities with In-Class Discussions



Rachel Peterson

One of the most powerful uses of technology is the ability for students to explore and manipulate equations and graphs in a visual way that isn't possible to describe in words and draw on a whiteboard. When we're looking for patterns and trying to describe change with mathematical representations, technology makes it a million times better and easier to understand, because you can actually see it real time. Using online tools in addition to in-class discussions or whatever else you're doing is powerful—just that one little piece! I would never want to go back to drawing things on a chalkboard. It's like imagine and then erase the line and imagine this and then you change that. It's just not as powerful! Ultimately my goal is that I want them to explore and make a conjecture, and then I want them to discuss where they agree or disagree with other students. I really am a fan of student discussions, especially table discussions and small group discussions. You can still do that while they're doing their own manipulations with technology. But I don't want everything to be done individually online. I would only move the discussion online if there are many, many options for a correct conjecture. I may have students discuss online so they can read many, many different ideas. You can't have a discussion in class where they're going to hear many ideas because there's too many. But online, they can. Sometimes it's hard for them to articulate in writing. So to be able to talk about it first and then write about it is helpful. Rather than saying, okay, look at this then write about it, students need to talk about it. I don't seem to get quality responses, unless they can talk about it with each other first.

Consider a teacher that has identified a problem of practice: I want my students to be able to connect an algebraic representation and a graphic representation.

Here are some ways the teacher could combine online and in-person activities.

Table 1

Planning for Online Integration: Student-Content

Student-Content Interactions

Online Activities:

1. Students use an online platform to repeatedly manipulate algebraic equations and observe how the corresponding graphic representations change and vice versa. Students repeatedly manipulate graphs and observe how the corresponding algebraic equations change.
2. Students use digital tools such as Endnote or Google Docs to record patterns in their observations.
3. Students practice applying new understanding by solving problems and receiving immediate feedback online until they are confident in their ability to solve these types of problems.

In-person Activities:

1. Students reflect on their ideas and use them to make conjectures about mathematical rules, writing them in a notebook or on a worksheet.
2. Students continue to work on individual practice problems on a worksheet.

Connection: The students will use what they discovered during online exploration to inform developing understanding of mathematical rules and then practice applying these rules.

Table 2

Planning for Online Integration: Student-Student

Student-Student Interactions

Online Activities:

1. Students will work together in group discussion boards to share observations and make conjectures about mathematical rules they are beginning to see during individual online exploration.
2. Students see others' thinking processes and discuss possible mathematical rules that extend beyond the examples they are exploring to arrive on absolute mathematical rules.

In-person Activities:

1. Students meet in person, in small groups, to continue to discuss and solidify mathematical rules.
2. The students will explore other situations where the established rule might apply.
3. Students prepare to present their findings with their peers.
4. Students share and discuss the solutions to their individual practice.

Connection: The work the students do online ensures that every student gets a chance to share his or her initial ideas. By collaborating online to determine mathematical rules, each student's voice can be heard and the loudest or most charismatic student doesn't dominate or direct the group's thinking. In person, students are able to work together in real-time to plan how they will present their findings to their peers.

Table 3

Planning for Online Integration: Student-Instructor

Student-Instructor Interactions

Online Activities:

1. The teacher will leave feedback on the discussion board, asking questions about students' thought processes and suggesting ideas to consider.
2. The teacher will give feedback on each group's plan by leaving comments on a group Google Doc.

In-person Activities:

1. The teacher will rotate and meet with individuals and groups throughout the process to correct misconceptions, make sure each student understands the mathematical principles that are being explored and discovered, and ensure students are staying caught up on practice exercises.

Connection: The teacher guides learners to establish and solidify their understanding of mathematical rules and supports them as they apply these rules to new situations or problems.

Think about why you would like to blend your classroom. In your blended teaching workbook, write your thoughts, creating your own purpose.



Blended Teaching Workbook

Write a brief statement about why you want to blend your classroom. Which purposes and outcomes are you most interested in for your blend? Access your Workbook [here](#). Make sure you save your copy where you can access it as you go through the math chapters.

6.3 Selecting a Blended Teaching Model

Once you have chosen an activity or activities to blend, consider which blended teaching model best fits the activity. (For a review of blended teaching models, see [Chapter 2 of *Online Integration in K-12 Blended Teaching: A Guide to Personalized Learning and Online Integration*](#).) The following videos give examples of some of the blended teaching models.

Station Rotation (6:09)



[Watch on YouTube](#)

Individual Rotation (5:16)

Flipped Classroom (3:35)

Flipped Classroom (5:49)

Lab Rotation (1:49)

Teachers Talk: Using Station Rotation



Sandy Chalke

In class I show my students interactive videos. We rotate among Socrative, Kahoot, and in class notes. At the end of the week the project is to work with a partner and cooperative learning groups to come up with a poster. The poster has to do something with the scenario that's given.

Teachers Talk: Changing to a Different Format



Rachel Peterson

It's very cool to see the benefit of changing to a different format where kids can play with things and explore. I'm seeing all the light bulbs go on, and students get really excited about their learning. It's so great!



6.4 Deciding What To Do In Person in a Math Class

Blended learning is the *strategic* combination of online and in-person modalities. But how do teachers decide which activities to do online and which to do in person?

One way to begin answering the question of what can be done most effectively in person is to look at your strengths as a teacher, the needs of your students, and the types of activities that lend themselves to the best use of the in-person space.

For example, students may be working (collaboratively or alone) on a math concept that has proved difficult for students to understand in the past, like graphing exponential functions. You want them to practice this concept in person because you know they will have many individual types of questions. Answering those questions and correcting

misconceptions in the moment that they come up can keep students from getting stalled in the process and keep energy high. It also helps assure that students don't have to back up and redo work.

Similarly, you may want to launch a new concept in person. You want students to get excited about the topic and begin thinking about the possibilities. Once they've had this beginning, they may be more ready to practice independently or participate in an online discussion.

Perhaps you are good at connecting mathematical concepts to real life situations, and your students enjoy hearing you describe these applications in person. You might want to step through applying mathematical concepts in person, practicing and discussing them.

Know yourself, your students, and your subject matter well enough to determine what you want to reserve the in-person space for.

Once you know how you can best use the in-person space, you can begin to explore ways to use the online space to allow the kinds of activities you want in the in-person space, to best use the affordances of the online space, and to make meaningful connections between the two modalities. Answers to the following questions may help you decide.

- Can I put some instruction online so I have more class time to work with students individually or in small groups?
- Can putting an activity online increase student participation?
- Can I use the online space to allow my students to personalize the pace, path, time, place, or goals of their learning?
- How can I use the online space to target individual learning needs?
- Can I use the online space to help students increase ownership of their learning?
- Can I use the online space to give my students access to materials they wouldn't otherwise have?
- Can I use the online space to teach the same concept in different ways, so learners will have more than one option in their learning?
- Can I use the online space to allow for greater learner-learner interaction and collaboration?
- Can I use the online space to adapt or differentiate materials to different students' needs?
- Are there new ways I can use the in-person space when I put some of the instruction and activities online?

Teachers Talk: Strategically Choosing Whether to Explore or Solidify Online (5:11)

Reflection Questions: How does the teacher in this video determine what activities will be done in person? What are some techniques that she uses that would work well in your classroom?

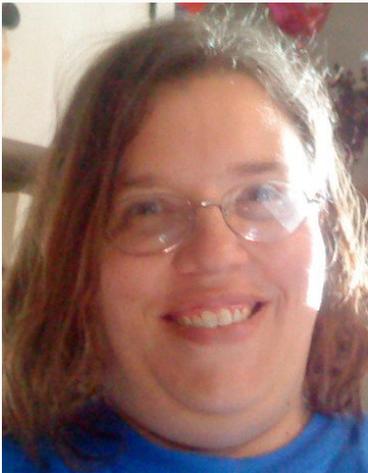
Teachers Talk: Deciding What To Do Online and In Person



Sandy Chalke

It all depends on the students. I actually ask the students, "What do you want to do? How will you be more successful?" At the beginning, when we do the bell ringer, I just pause for a minute and I explain the concept. Then I ask the students, "How many of you feel comfortable taking notes online?" Sometimes students who are not motivated say yes, and I give them a chance. And then I say, you know what I really want you to do is sit with me and listen. So then I actually go back and look at my assessment and see who needs that extra support instead of just sending them on their way.

Teachers Talk: Switch It Up



Dawn Schlink

Sometimes kids get tired of the technology. Blended means really and truly blended. Even though students love technology, they do not want to be on the computer for an entire class period.

Teachers Talk: In-Class Discussion to Solidify Online Exploration



Mikki Stuart

After using Desmos (a digital tool specifically used in math instruction), we have really great discussions of things that the students notice and are able to connect to prior learning. Students make awesome connections in our discussion after having that really visual tool where they were able to kind of look and explore at their own pace.

6.5 Evaluating Blended Activities

Blended learning is not just about using technology in the classroom. It is about strategically combining technology with in-person activities to improve pedagogy and student outcomes.

The PIC-RAT and 4Es frameworks provides a means of evaluating your use of technology to see if it is adding value to your classroom. It helps you evaluate students' relationship to technology as well as its impact on traditional practices.

For a complete explanation of the PIC-RAT framework, See 2.3.1 "[The RAT Framework](#)," 2.3.2 "[Blended Activities that Engage \(The PIC Framework\)](#)," and 2.3.3 "[An Evaluative Framework for Blended Teaching](#)" in Chapter 2 "Online Integration" of *K-12 Blended Teaching: A Guide to Personalized Learning and Online Integration*. For an in-depth discussion of the PIC-RAT and 4Es of evaluation, review [Chapter 3](#) of this book.

Teachers Talk: Desmos and Geogebra



Rachel Peterson

Desmos and Geogebra are essential for mathematics, I think. They're just built for math, so there's a lot of ready-made things. That saves a lot of time.

Teachers Talk: Using the Online Space to Explore and Investigate (3:09)

Reflection Questions: How does the the teacher in this video evaluate online activities to help her make instructional decisions?



6.6 Planning Blended Routines and Behaviors

Routines

Establishing routines in a blended classroom is crucial. Helping students understand when and how to move around the classroom, how to access an LMS or other online programs, how to log in and out, where and how to store hardware, how to communicate civilly and respectfully, and how to turn in assignments is essential in creating a usable blend. In addition, making plans for how to manage off-task behavior can prepare you for situations that are sure to arise.

General:

1. Decide specifically the kinds of behavior and routines you want to put in place.
2. Spend the first two or three weeks drilling and practicing those routines.
3. Set clear expectations.
4. Decide what you will do to help students who have a difficult time meeting the expectations. How will you respond to them?
5. Evaluate your plan and make adjustments as needed.

Teachers Talk: Classroom Management When Blending (4:12)

Reflection Question: How does the teacher in this video manage students in a blended classroom?

Teachers Talk: Engaging Students While Working One-On-One with Another Student



Rachel Peterson

When I'm going around talking to students individually, it's very powerful and meaningful. But when I'm doing that, if they're not doing something online, then I'm not getting the data from that. I'm having to ignore everything else going on. But if the rest of the students are completing something online, I also have that data and I can go back and look at that. I'm kind of double dipping there.

Table 4

Blended Learning Routines

Blended Learning Routines—Teacher Tips

Student Movement	<ul style="list-style-type: none"> • Will you have activities that require the movement of students (such as in a station or lab rotation). <ul style="list-style-type: none"> ◦ Will students be moving all at the same time? ◦ At different times? ◦ Plan an efficient way to facilitate those movements. • You may have students do three things when coming class: <ul style="list-style-type: none"> ◦ Open their grading portal and check their grades. ◦ Open their email. ◦ Open the class website to see if there are any new posts. • Be very clear. Make few rules but enforce them well.
Hardware Management	<ul style="list-style-type: none"> • Use of cell phones (some teachers collect them so they don't have them in class; others let them use them for assignments). • Keep Chromebooks or other hardware charged. (If devices are kept in the classroom, students don't take them home.) • Establish a routine for making sure computers are charged into the right charging station. • Create checklists. • Make assignments or class roles for hardware management. <ul style="list-style-type: none"> ◦ Make sure computers are plugged in and charging. ◦ Sanitize computers. ◦ Keep a log of damages or problems. • Assign specific computers to specific desks or specific students; this increases accountability. • Teach how to hold and carry devices; practice.

Blended Learning Routines—Teacher Tips

Software Management	<ul style="list-style-type: none"> • Explain how to turn on the computer, log in, and access the internet or specific tools. • Practice using the LMS, opening it, finding assignments, checking grades, submitting assignments, etc. • If you have specific formats you want students to use when submitting assignments, teach them what they are. • Create checklists for students to follow. • Teach students how to download, upload, and organize files. • Model and practice any management strategies or procedures that you teach your students.
Student Questions	<ul style="list-style-type: none"> • Teach them where to find answers before they ask you. • Outline specific ways to contact you outside of class and how to address you politely. • Teach them how to use email. • Establish “expert” students that other students can turn to for help. • Create instructional videos or review pages students can access when they have common questions.
Classroom Configuration	<ul style="list-style-type: none"> • Decide what kinds of activities you do in your classroom. Are there classroom configurations that will support those activities? For example: <ul style="list-style-type: none"> ◦ Create a comfortable space for reviewing online lessons, instructions, and materials. ◦ Create a space for collaboration, where students can talk together. ◦ Create a quiet space for working on assignments or other thoughtful activities. ◦ If you have fewer than 1-to-1 devices, create a space for working with the technology.
Off-task Behavior	<ul style="list-style-type: none"> • Use software that allows you to monitor what is on the screen of each student. • Teach them to monitor themselves. • Create guidelines for students who may stray away from what they're supposed to be doing on their computers, such as shutting down the computers and using paper again for a day. • Walk around the classroom, both to be available for help and to give quiet reminders to stay on task. • Remember that even "good" students can get off task at times. • Utilize your LMS or other software to keep track of online behavior. • Have a place near you that's easily observable and accessible and away from other students if you need to monitor some students more closely.
Other	<ul style="list-style-type: none"> • Help students develop time management skills so that they use their time as efficiently as possible.

What does your ideal blended classroom look like and what routines do you need to put in place to create such an environment?

Math teachers say they typically spend four to six weeks at the beginning of the year establishing routines and expectations and teaching students how to use the technology. But, they say, it pays off in the long run with a smooth-running class and increased opportunities for interaction and

personalization—all of which they see as positives in their blended classroom.

As you begin to blend your math classes, it is important that you make sure to do so with specific goals in mind and that you provide supporting scaffolds for everyone involved in the process. This includes yourself, your students, and any other stakeholders who may be affected by your transition to and implementation of blended learning.

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