

How to listen to your math class

Tim Hsu, San José State Univ.

You may have already read some set of helpful hints (like mine!) about how to give a math lecture. However, if you're actually teaching a class and not just giving an isolated lecture, what turns out to be more difficult, and in some ways, more important, is to figure out how to *listen* to your class. Here are a few thoughts that may help.

Why is listening so important? Let me answer that question with more questions: Why is it so difficult to teach courses online? Why can't we (teachers) be replaced by textbooks and YouTube? With so many great exercise videos out there, why do people hire personal trainers?

My answer to these questions is: Human beings learning how to do something need feedback. We need someone to tell us if we're doing it right or wrong, to let us know (ideally quickly) how to fix it, and yes, we need encouragement and support. The place where you will earn your paycheck is just as much in doing all of those things as it is in lecturing — maybe more so.

Help your students feel comfortable. Before you can listen to your students, they have to feel at home enough to be willing to speak up. Here are a few ways to help them do that:

- **Treat people with respect.** Teaching is much the same as any other part of life: If you treat people with respect, they'll respond in kind. For younger (say, ≤ 20 years old) students in particular, if you treat them like grownups, they'll act more like grownups.
- **Learn everyone's name.** This is not easy to do (at least for me!), but it's important: Addressing people by name helps them to feel more like a human being and less like an ID number, and again, if they feel more human, they're more likely to treat you, and each other, in a humane way. (And as a bonus, they're less likely to cheat; it's easier to like a faceless entity and harder to lie to someone you know.)

Two tricks that help are:

- *Do something on Day 1 that helps you learn names.* Taking pictures works great, and you can do it with a phone or laptop.
- *Call on people by name,* at least until you learn everyone's name.
- **Stay even-tempered.** Confession: This is one point I struggle with personally. For many of you, this should be no problem, but for some of you, it may be nontrivial to keep from getting angry at students for any number of reasons. The fact remains that every time you blow your top, you damage your relationship with everyone in the room.
- **You are the grownup.** Finally, especially for those of you closer in age to the students you're teaching, you have to remember that you are not there to be friends with your students; you have to be the grownup in the room. (See: Staying even-tempered.) Don't get me wrong: You can, and should, be *friendly* and open with your

students. However, any friendship in which one person (you) will eventually have to make a life-changing judgement about the other (your students) has fundamental difficulties, and ultimately, it's dishonest to pretend things are any other way.

Asking questions. Even when you establish a good atmosphere in your classroom, you may find that your students don't naturally speak up. The first way to help them speak up is to ask questions well.

- The key point is that when you ask a question, **WAIT** a nontrivial amount of time before you give up or answer it yourself. And by nontrivial, I mean that many instructors (and not just beginners) wait for times on the order of 1 second or less. Try looking at the clock, counting to 10 Mississippi, or something of that nature, to force yourself to **WAIT**. And if no one answers? Maybe what you said didn't make sense to anyone, and you need to go back and go over things again!
- **Ask open-ended questions**, not fill-in-the-blank questions. If you've seen *Ferris Bueller's Day Off*, you want to avoid "And then came the Great? Anyone? Anyone? Depression?" model.
- Better just to go with "Any questions?" But then you really have to mean it; **WAIT** until everyone gets at least a little uncomfortable before moving on. (Sometimes, students will speak up just to fill the silence, which is good!)
- **Ask people to raise their hands.** This helps shy and quiet people speak, as well as giving confused people time to formulate their questions. (After all, it's the confused people that you need to reach!) And then make sure to **WAIT** until you can call on one of those shy people.
- **Avoid the volume-ocracy and the "quick buzzer":** You will quickly learn that a few of your students will respond to every question instantly. Those are exactly the people you don't want to hear from all of the time! Make sure they don't dominate the conversation, by **WAITING** until other people raise their hands and calling on them.
- **Vary the people you call on.** Some tricks that work, from me and other instructors: "Let's hear from someone who hasn't spoken recently." "Let's have someone from the left/right side of the room." "Someone from the back of the room."
- One question sure not to get a response: "**Did anyone not understand that?**" More precisely, the students least likely to respond to that question out of shame are exactly those students most likely not to have understood. If you really need to see what portion of the class gets it, try doing an interactive followup activity, like a worksheet or working on a problem in groups. If you don't have time for interactivity, try doing a (noncredit) pop quiz where everyone shouts out the answer. (Or if you happen to have clicker technology on hand, a clicker quiz.)
- Any questions? Make sense? Did I mention, when you ask a question, **WAIT** to hear an answer?

Answering questions. Conversely, here are some ideas about what to do when students ask you questions.

- Try starting by repeating the question out loud. This is especially important if the student is quiet or the acoustics of the room are bad. (It also gives you time to stall if you don't know the answer.)
- In addition to answering the question literally, try to think really hard about what is leading the student to ask this question. If you can understand the point of view that produces the question, you'll give a better answer.
- Sometimes you get questions in the middle of trying to lecture on a topic. What you do then should depend on how relevant the question is:
 - If the question is relevant, make sure it gets closure, often off to the side of what you're writing on the board. Then make sure you come back to what you were doing.
 - If the question will come up later in your plans, say "hold that thought" and then come back to it at the appropriate time.
 - If the question is only relevant to the asker and not the rest of the class, or threatens to take up too much time to answer, or is unanswerable nonsense (this happens!), say (respectfully) "Let's talk about this after class." (And try to make sure you actually do!)
- If you get lots of questions about the same point, maybe something has gone wrong. Change course and relecture!

Dealing with personal/interpersonal issues. Here are some very common sources of awkwardness in discussion/classroom social interaction, and my thoughts on how to deal with them.

- **The low talker/person who never says a word.** Every class I teach, at almost any level, has a substantial percentage of the class that falls in this category. To get such people to speak up:
 - Try doing in-class group work; for many people, it's easier to speak up in a group of four than in a group of 40. And when you go around to visit groups, try to help people recognize the contributions of quiet people, or conversely, make sure people who are confused get help from others.
 - Try to give positive reinforcement/praise when people do speak up.
 - Did you see the discussion above about **WAITING** for responses when you ask questions?
 - In the end, however, some people refuse to talk in class except at, essentially, gunpoint. Now, some teachers will cold-call on people to force them to speak, but at this point, my personal feeling is to acknowledge that some people are determined not to participate, and there's not much we can do about that.

- **The person not paying attention/texting/websurfing/falling asleep.** In many ways, this is not the end of the world, as long as the student is not distracting others; I personally just let this sort of thing go. What I do think is true, though, is that you need to come with a rule about when you're going to "wake people up" (figuratively or literally) and apply it consistently.
- **The monopolizer.** This is someone who answers all of your questions and maybe even brings up interesting points, and is usually a really good student, but who has the undesirable side effect of intimidating everyone else in the class. This is tricky, because you want to be careful not to discourage or punish someone for being smart, but you also want to give everyone else some space not to be embarrassed. Some things you might try include:
 - As mentioned above, call on "someone who hasn't spoken today."
 - If a monopolizer starts to chime in, try to remind that person gently that everyone needs to have a chance to talk.
 - If it gets really bad, try talking with your monopolizer after class.
- **Gender, cultural, racial, religious, and other social issues.** The most common social issue arising in math classes is gender, which shows up all the time in the following way (and other, similar situations). If there are two, or even more so, three, men doing in-class group work with one woman, it is not a rare occurrence to see/hear the men ignore the woman or otherwise exclude her from what's happening, often not in a malicious way. (Think of this as the "Black Widow in the Avengers" problem.) I don't have a great solution for this, though sometimes, when I visit a group with this dynamic, I make a point of talking to the excluded person and getting their opinions/thoughts. Perhaps I should just say, please be aware of the potential problem, and if you come up with a good solution, please let me know!

Other than that, social issues and political conflict are not usually an overt problem in math classes, perhaps because conflict is less likely to arise from within the subject matter (as compared to, say, a political science class). In any case, if you do run into a problem coming from social/political issues, please bring it to the TA supervisors and the other TA's, and we'll discuss it on a case-by-case basis.