

Teaching Statement

Alexander Reznikov

1 Introduction

From my middle school I found it nice and fruitful to help others in learning math. It began, of course, with helping my classmates in high school; than continued with tutoring other students in college. Now to teach math is a part of my job. I find teaching very interesting and important; I always look for ways to improve my teaching skills.

I started teaching from conducting problem sessions for a small class; I was doing recitations for College Algebra, Calculus II and III; then, I was considered good enough to teach a small class in Calculus I on my own. In the beginning of my teaching experience my responsibilities were to prepare students for quizzes and exams, to answer their questions and solve problems from the homework. As I gained more experience, my responsibilities became wider: I had to write the whole syllabus, think through the course structure and to write the quizzes and exams on my own.

Teaching any math course is always a challenge: I feel that I need to give my students a piece of abstract theory; on the other hand, I need to support this theory with examples. Ideally, these examples should be close to the “real life”. Furthermore, my students should always feel that I am “in” this class as much as they are; to give them this feeling, I try to do selected homework problems on the blackboard. And all this material should fit in time.

Moreover, from time to time I have to monitor what my students have learned. I feel responsible for students and thus I need to keep track of how I am doing my job; and how they are doing their job. For this means I use short quizzes at the end of the class.

To summarize all written above, the major parts of teaching are: a balance between abstract theory and practical examples; monitoring my own and my students’ progress; and a proper time management.

Below I try to explain in detail how I try to bring my students to success in learning math.

2 Class organization

When I prepare for the class, I always try to organize it in a manner that helps students to learn. Generally, the class consists of following parts.

Reminding the past material with emphasis on parts that we will use in the class. Of course, I want my students to get a feeling that everything in math (and, at least, in the course) is interconnected. Thus, I want them to keep in mind what happened before and understand how it relates to what is going to happen now. As in the “to be continued” TV show series, I try to remind them briefly but clearly what happened in the previous episode of our course.

This reminder plays one more role: when a student sees something that she has already learned, it gives a feeling that the material is not too scary. It is always better to start with something easy and proceed with something new.

A general idea of the new material. Sometimes, a preliminary example. Before all rigorous statements of the new material I always try to give my students a good feeling of what is going to happen. From my own student years I know that it is as important to understand the real meaning of all theorems as to know the exact statements.

Thus I try to illustrate the new material: to draw clarifying pictures, or to solve a preliminary example. The example also immediately shows how the new theory can be applied. I consider this part of the class to be very important; and I always try to make sure that students got the correct idea of our immediate plans.

The new theory. After all preliminary work is done, it is time for the rigorous mathematical material. There is a challenge here: I need to emphasize the difference between the “general idea” and the exact statement. Besides, I need to explain every part of this exact statement, and importance of each hypothesis.

When I see that students have read and understood the statement, I try to present a proof of it. And this part requires a lot of preparation before class. In fact, I need to figure out several things: whether to give a full proof or not; which parts of the proof to replace with pictures or ideas. I prefer give the full proof; however, sometimes it is too complicated and consumes too much time. I do not want to scare my students too much! And, finally, now and then even the textbook suggests not to give a full proof of a theorem.

Another challenge of this part is obvious: I never go too fast with a proof or statement; on the other hand, I need to make sure that there is time for supporting examples. This also requires some preparation for the class. However, my experience in teaching (and learning) allows me to manage time in a decent way.

Examples that support the new material. After the theorem or theorems are stated and proved, and the students are a little tired, I need to show them some applications. Ideally, there should be applications of two kinds: a nice example about how one can apply (or see) the theorem in the real life; and some mathematical examples. Also, it is always good to show an example that is possible but hard to solve without new theory, but that has an easy solution that makes use of our new material.

This part is the last chance to show that the new material is, in fact, useful, nice, and not that hard. Therefore, I always prepare some good examples at home; I arrange them in the way that is best for students.

The balance. It is worth mentioning that the balance between the above sections of the class depends on the students’ level. It is my responsibility to estimate this level in the first one or two classes. If the level of my students is high enough, I can be more rigorous. If I see that the level is not very high (for example, if most of the students did not take any math class before) then I try to give more examples and substitute rigorous statements with good intuition. For example, when I was teaching College Algebra, I never said a word “function” without drawing a careful picture. Sometimes, instead of giving a very careful formulation of a statement I showed what happens on this picture. In the course Calculus II students could better deal with abstract notions, and I could write statements of the theorems in all details.

A summary. If time allows, I always try to make a summary at the end of the class. That is, I remind what we have just learned and what kinds of problems it allows to handle. The summary is always short, but is very useful: it brings together all the new material.

3 Interaction with students

Interaction with students on different levels is extremely important. It is my job to show the students that I am involved not only in mathematics, but also in helping them to succeed in the present and future courses. This means that I am willing to help them in and outside of the classroom.

As always, usually I interact with students in the classroom, during my office hours, and via email.

Classroom interaction When I was a student, I always appreciated when my professor was willing to answer any question. Some professors looked even grateful to a student who asked a question; I and other students appreciated this reaction very much.

In the classroom I try to show how happy I am when a student asks a question. No matter how good it is, it shows that the student is interested. I usually say something like “Thank you for the question” before or after answering it. I also try to make sure that I understood the question, and that the student understood my answer.

I also try to get my students involved by asking them a question. I always give them some time to answer it; and always thank them for the answer. If the answer is wrong, I always try to explain why it is wrong, and then repeat the question. It gives the students a chance to give a correct answer. Of course, I do not want to discourage my students, and do not ask too hard or tricky questions. As a reward, I often see smiles on their faces when they give a correct answer.

To summarize, I enjoy asking and answering questions, as it is a great way to learn the subject in depth.

Office hours Office hours is also a nice way to get students involved in discussion. Shy students often do not want to talk in front of their classmates, but are much more daring in private. I try to show them that I like answering their questions and that there is nothing to be shy about. Sometimes after few meetings in my office, these students start asking and answering questions in class. Thus, one of advantages of office hours is a chance to show shy and scared students that things are not too bad and hard.

Another advantage of office hours is a chance to “catch up”. Even though it is written in all syllaby that office hours are not to make up for missed lecture, I agree to teach a student the material she missed. The reason is that I do not want to loose the student forever; it is much better to spend a half an hour repeating the recent material. As I noticed, students do not overuse this, and do not start skipping all lectures. On the contrary, they appreciate my attitude and willingness to work hard; and they work harder too.

In general, I try to have three office hours every weak. I try to have them on time which suites most of my students. I also emphasize that a student can contact me by email or after class to set an additional time to talk. Again, students do not overuse my willigness to help them and answer their questions.

Email In recent years interacting via email is the easiest way to help students, and the easiest way to show that I am involved. Students enjoy to ask questions via email; and if I answer fast they do appreciate it. From time to time I get thankful emails.

Usually, when a student asks how to solve a problem, I first respond with a general hint. I want to give the student a chance to work out the problem using only suggested strategy. If the student keeps asking, I give more and more precise hints. Usually the student understands how to do the problem after first or second email.

Such an interaction allows to guide the student through the problem slowly, with no rush, and to give the student a chance to finish the problem from any step.

4 Dealing with the accent

As any normal person, I have several weaknesses. I think that it is important not to deny them.

One of such weaknesses is the accent. I came to United States when I was 22 years old, and, of course, my English is not as clear as some students want. However, I believe that with proper attitude I am understood by all students.

First thing I try to do is to *slow down*. It is never good to speak too fast. I always give my students time to *listen* to what I say and to *understand* what I say. Moreover, I always give myself time to look at students, establish eye contact and make sure that they understood. I never proceed with something new if I see too many sad faces. If I feel that my students did not understand something, I try to reformulate it in other words.

Besides that, I try to write all necessary things on the board. For example, I never skip words in formulation of theorems or examples. I always write the whole statement.

I believe that these measures essentially eliminate the language barrier and allow my students to understand what I want to say.

5 Balance between old and new technologies

Nowadays the impact of technologies on our lives is great. And it can not be avoided in teaching.

In Michigan State University, in almost all courses, the system called WebWork is used. The homework is now turned in on the internet, and is graded by the computer. It has obvious pros and cons. For example, the

student needs to enter only the answer, and it is a lot harder to see if she understands the solution well. On the other hand, the student has a lot of attempts, and thus has an opportunity to correct a mistake she made.

I always try to monitor the problems given in the homework; and, of course, I try to monitor the students' progress. If I see that some particular problem is hard (not a lot of students solved it), I mention it in class. Sometimes I solve a similar problem; or give a hint.

I also try to control the "new technology" using the "old one". From time to time I give a quiz with a problem that was in the homework. It shows how many students understood the full solution of the problem; it also gives them a reason to understand the whole solution.

Besides the homework, it appears to be very good to use internet for grade reports. There are a lot of systems that allow to enter students' grades and then send a report to every student with only her grades. Also, I try to use some system (Michigan State University offers one) to place there the course materials. It allows students to access the lecture notes from their computer. However, I always encourage students to take notes in class and try to show them that it is essential. For example, some quizzes I give are "close computers", but "open notes". It shows the student that she can use *her* work during the quiz, but not *my* work. I should note that most students appreciate this attitude and do not rely only on my notes. However, they feel that they can consult one more source; this makes them feel safer.

6 Teaching award and students' feedback

After four years of teaching I was awarded a teaching prize: the "**Department of Mathematics Graduate Teaching Assistant Award**". I strongly believe that this award was a result of great feedback that my students give me. Here are some quotes from the official evaluations my students gave me.

- *Makes it clear, and understandable.*
- *I feel he knew the material very well.*
- *Detailing examples and process of solving on black board.*
- *Able to make class interesting and maintain attention.*
- *The TA is flexible when needed.*
- *Does a good job at teaching the material and following the book.*
- *Easily approachable and available for help.*
- *He seems very enthusiastic about math.*
- *He is excellent at math.*