When I first started out as a teaching assistant I was very conscientious. I spent a lot of time talking to my students outside of class, trying to find out what they didn’t understand and finding ways of explaining it to them. I would then proceed to give mini-lectures during my discussion sessions, trying to cater to both the weaker and the stronger students. I was quite pleased with the way I conducted my classes, and I got a lot of positive feedback from my students. There was just one slight problem: Every so often students would lose their concentration and my beautiful presentation would be useless.

This gradually made me realize that one of the basic problems in teaching is simply to keep the students focused on what is happening, or to put it more bluntly — keep the students awake! I tried several methods, ranging from telling jokes to periodically slamming the blackboard with the eraser. They were all somewhat successful, at least for some time. But they didn’t solve my basic problem. Then I started thinking about my own experience as a student. I must confess that I have always had trouble paying attention in class. (The only lectures I don’t fall asleep in are the ones I give myself.) But the ones where I dozed off the least were always my foreign language classes. Why? Because during those classes we were constantly bombarded with questions. That forced us to be attentive.

I have come to believe that we can learn a lot about teaching math from language teaching. It is commonly accepted that learning a foreign language requires constant drilling. The “new math” movement tried to focus on the concepts, but at the end of the day I feel that most people agree that most undergraduate math classes requires a lot of drilling. As a matter of fact, I believe that the same is true of mathematics at all levels. I usually find it hard to grasp a concept before I have
worked out some examples. A research paper that looks very abstract and elegant might be based on page after page of struggling with concrete examples.

I believe that the best way to develop that kind of skill is through directing questions to individual students. Unfortunately this raises several other issues.

Many years ago, I was a teaching assistant in a class where one of the other teaching assistants was a firm believer in asking the students questions. He would ask fairly hard questions, and when one of them couldn’t answer (or was too timid to answer) he would move on to the next student. His classes were probably very good. The only problem was that a large number of his students were scared away from his class and started attending my class! This is a basic problem. Most students suffer from “math anxiety” to start with anyway, so I honestly think that it is an important consideration to make sure that they don’t feel even more uncomfortable about and alienated from the class.

I believe that again we can learn from comparing with language classes. The question asked in language classes are usually simple drill-type questions that the students are expected to be able to answer right away.

I have tried a similar approach in my discussion sections. I ask simple questions of the type: “why can we do this”, “what do we do next” etc. If I know that the student is weak I will ask a real trivial question, while the top student might get quite hard questions. In this way I feel that it is possible to cater to different types of students. I usually just move along the rows, and I might sometimes be able to ask everybody twice (about one question each minute).

This approach also has the advantage that it gives me a clear idea about how much (or rather how little) the students understand. A lot of lecturers really have no idea about where the students stand. The exam can sometimes be just as much of a shock for them as for the students. This is especially relevant here in Singapore. I must confess that I often feel that teaching in Singapore is a lot like doing shadowboxing. In other countries you can often tell right away whether the students understand you or not. You just have to look at their facial expressions. That, however, does not always work here. Many of our students can easily sit for 50 minutes without moving a single muscle in their face.

It is hard to do anything about this during lectures, but during tutorials I try to force them to respond. It is of course very important that the students don’t feel that they “lose face.” But I feel that I have developed a style that is fairly suitable. It is impossible to totally avoid embarrassing some students, but by asking many questions and keeping them simple, I can at least minimize the damage. If the student seems unsure I will give a hint or sometimes provide the answer myself. I will never pass an unanswered question on to another student. The students don’t like it, but I feel that they don’t really object to it either.

I once read about a survey that had been done about how long university teachers would pause after asking: “Any questions?”, before moving on to the next
topic. The average pause was, I believe, less than two seconds. I think that that is fairly typical for the way many of us teach. I think most of us would be quite shocked if anybody ever dared to ask a question at such a time. I think that we have to ask the questions, and I feel that with some care it can be done in a way that both encourages learning and avoids putting too much pressure on the students.