# *Teaching Tips*

## *Using Office Hours: Tips for One-on-One Teaching*


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Teaching is getting the students' minds active on the topic and helping them construct their own understanding of the topic. It is clear that this is best done one-on-one. In a classic 1980's study the late Benjamin Bloom showed that teaching college students a course by tutoring one-on-one, instead of lecturing, improved the learning by two standard deviations. (1) This turns out to be a whooping increase. Obviously, we cannot teach our undergraduate courses that way; it is not economically feasible. However, the data do highlight the value of our one-on-one times with students, such as when they use our office hours.

In working with a student during office hours, our objectives are to

> keep the student's mind active on the subject.

> unearth and help the student correct her/his misconceptions.

These lead to the following ideas (2).

**Set a Collegial Atmosphere**

Nothing can short circuit our teaching objectives quicker than for the student to feel unwelcome or belittled in the presence of the professor. We professors must be particularly attentive to not project either attitude given that some students can be very sensitive to both. A list of "don'ts" include: don't look at your watch, don't sigh as though you really haven't time for this, and don't speak parentally about their study habits or lack of understanding.

On the proactive side, you might try the following. When announcing your office hours to a class, encourage students to use them and talk about the extra learning that one-on-one sessions came accomplish. When a student shows up at your office hours, welcome them, ask their name and use it, ask how they are doing in the course. If you have to restrict their time with you, tell them that; "John, I can only give you 10 minutes, given that other students are waiting, but we can get a lot done in that time." Find something to compliment what the student does during the session. Thank the student for coming by and talking with you; invite them back.

If it is clear that the student is not studying enough or studying the best way, don't speak parentally. Rather speak as you would when giving a colleague suggestions. "John, I really think it would help to get your study time for this course up to 5 hours per week. Also, I suggest you make notes about why you did a problem a certain way rather then just trying to get through a number of problems. That helps the mind get into the topic with more depth."

**Ask Probing Questions**

The questions we ask are a key tool in our work with students. We want to find out where the student's understanding is and where their misconceptions are. The best way to uncover both is to get the student talking about the subject. A wonderful way to get them talking is to ask questions. Some that may be useful starters are:

"Tell me your thinking about the problem"

"Talk to me about what ------- means."

"What is you mental picture of what is happening in this problem"

"Explain to me what you have done with the problem so far"

"Can you explain what you meant by--------?"


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**Don't Give Another Lecture**

If hearing a lecture on the topic was all the student needed, they would have gotten the material in class. Another lecture is not called for; a dialog is needed. Thus if a student opens with "I don't understand problem #5", don't go into a 3 minute lecture showing how to do #5; rather, get the student talking about #5 by using one of the probing questions given above.

If the student responds to your probes nicely and you see where the misunderstanding lies, don't go into a mini-lecture on the misunderstanding. It is better to talk only about 30-45 seconds and then turn it back to the student using questions like

"Does that make sense? Good! Can you explain it to me now?"

"How might we use that idea in this problem?"

"I said that -------, tell me what that means to you."

When your idea seems understood by the student, you can go on to another 30-45 second talk and then turn it back to the student with more questions. Some useful ending questions for the dialog are

"Now explain to me how we do the problem."

"Why does that step work, do you think?"

"Tell me what you see happening here physically (or at the molecular level)".

When I get a student who will simply not engage in dialog, despite all my wonderful questions, I will give in and show them how to do the problem; that is, I will do a mini-lecture. However, I then send them out in the hall to do a similar problem in detail. I require them to return to my office in 10-15 minutes and explain to me what they have done so far. This "work then talk" approach almost always gets us into a good dialog eventually.

**Use Wait-time**

"Wait-time" is education jargon for silence, and it is invaluable in creating deep discussions. What it means is to pause a few seconds (3-5 are recommended) after the student asks you a question or after you have asked them one. This silence gives both parties time to think and articulate deeper answers. In fact, when you pause after the student asks you a question they will often begin elaborating on what they mean and give you the insight you need into their thinking. When you pause after asking them a question, they realize you do expect an answer and can begin formulating one.

**Ask some Higher-level Thinking Questions**

We want students to see our subjects as more than just recalled facts, definitions, and procedure; we want them to have useful mental models about the concepts and to see the connections among concepts. We can encourage this level of thinking by using questions that demand more than recall thinking. Those above that ask for explanations or for student descriptions of what is happening should foster high-level thinking. Another idea is to occasionally ask the student to speculate on where the concept might be used in his/her discipline. "Where might a Civil Engineer encounter limiting reagents?" The office hour is a wonderful time to engage a student at that level of thinking and it help cement the concept being studied.


1. "The 2 Sigma Problem: The Search for Methods of Group Instruction as Effective as One-on-One Teaching" , Bloom, B.S., Educational Researcher, pgs 3-16 (1984).
2. The ideas are ones we use in the annual CSM TA Training Workshop described in "An Active Learning, Student-Centered Approach to Training Graduate Teaching Assistants", Pavelich, M.J. and Streveler, R.A., Proceedings of the 34th ASEE/IEEE Frontiers in Education Conference, Session F1E (2004). Posted at http://www.mines.edu/research/cee/Fundamentals_of_College_Teaching.pdf