



TAing Advice for Sciences & Engineering TAs:

ADVICE GREAT TEACHERS GIVE

Below is a compilation of some of the best advice from teaching-award winning professors that they give to their TAs. The advice is listed up front but read below for a wider variety of context(s) where and how this advice may be interpreted.

The more time you spend (or have spent) crafting your teaching, the deeper and more diverse your interpretation of this advice will be. TAing is an apprenticeship.

1. **Be passionate!** or "Wear your geek on your sleeve!"
2. **Be creative & experiment with teaching!**
3. **Effective preparation leads to effective tutorials!**
4. **Be respectful and empathetic!** Try to connect with students!
5. **Spend your time well, we don't have much of it!** Figure out your priorities.
6. **Don't talk too much but definitely talk!** *Proactively* engage the students!
7. **If you don't know the answer, find it out & follow-up with the student!**
8. **Try to Figure out what the students need, not only what you can give them!**
9. **Take ownership of your space!** Physical and intrapersonal, alike!
10. **Students may not know as much as you want them to but they also learn a lot faster than you think they can!**



Advice Great Teachers Give with some Context:

1. BE PASSIONATE! WEAR YOUR GEEK ON YOUR SLEEVE!

A geek is a person who knows a lot about something because they love it. Everyone is a nerd in their own way. When you're doing something you enjoy it shows. People respond positively to this. You got to grad school so you know a lot more than most undergraduates. Understand this and be confident that you're not here accidentally.

For starters, if you don't 'seem' to enjoy the material, why should the student? Negativity, is detrimental to motivating anyone. It turns out that when students see their peers succeed it gives them a positive feeling towards that activity or problem solving. The passion you have creates a positive atmosphere that allows students who maybe struggling to keep trying and persist in situations where they would otherwise give up on the problem. If they share your interests, great! This overt interest will provide a gateway to connecting the material with the lives of the students. If they just feel better about working through more problems than they've gained something nonetheless!

2. Be creative & experiment with teaching!

Effective teaching takes time to develop. You may be TAing for a course that is well structured (e.g. most larger introductory class require a high degree of structure to be manageable) however, most profs actually don't mind if you try something new. If you're willing to (re-)develop a tutorial lesson than most profs will gladly take advantage of your extra effort. Be open with them that you want to develop in your ability to teach and be forthcoming in how you plan to accomplish the task. During discussions with the course instructor you'll iron out many unanticipated issues that may arise. That being said, most seasoned teachers know that it takes at least three attempts to run an activity or to make an exercise be "effective" in the way they originally planned.

So, give yourself multiple opportunities to try new things and reflect, refine and try again before you decide that a technique does or doesn't work. And don't be afraid to let your students know why you're trying something new. However, you also need to explain the benefit or goal for the student. Otherwise, they'll likely not engage in the intended way and ultimately not see the value. Ultimately, if no one tried anything new than we wouldn't get very far in anything we did!

3. Effective Preparation leads to effective tutorials.

One major difference between novice and expert problem solvers is the amount of time spent designing their approach; that is, time spent preparing to solve a problem. Many TAs have minimal time for preparing for the tutorial even though preparation is essential for having an effective tutorial. So, use your time wisely to plan. This will depend on your level of comfort with the subject at hand. If you don't know the material prep time might be spent reviewing the material for yourself so that you're confident to explain the material. If you know the material but want to present it in a new or interactive way, use your prep time to prepare new activities or handouts, or how you will divide groups. See #2 above, but explaining the purpose and value to students is key to a chance at success. At the very least, use this time to prepare questions! Questions for opening the topic and for reviewing previous knowledge, for assessing logic and breaking up complex material into smaller, more easily understood, parts and for assessing whether the students understand the application and extension of the concepts beyond this class to future class and course material. Preparation prevents poor performance!

4. Be respectful and empathetic! Try to connect with students!

The #1 thing that students want from their TAs at U of T is to be **approachable!** This implies that you treat people with respect because without respect what sort of relationship do you have? Once both people are treated with respect than actually becoming aware of the students is the next step in understanding what the student might know or be confused about. This requires some degree of empathy. This doesn't always mean being the shoulder to cry on when students come up short of their goals but it does mean that you may have to ask a few more questions to find out what and why students don't understand so that you can ask questions or give advice (depending on the situation) that empower the students to take the next steps towards a solution to their problem or improve upon poor performance.

5. Spend your time well! None of us, have enough of it!

Time is the limiting factor for many things in life. Your TAship is especially short, so, plan well (see #3 above) so that you've got the time to do your TAship as best you can and still make progress in your research and studies. Planning ahead when and how long you have to do your research, your courses, your TAship and your social life. This doesn't necessarily mean riding yourself of distractions (distractions will always arise no matter what you do!) instead try making the things that are important to you so important that you spend your time on them with little time left for the unimportant things (Cal Newport - Studyhacks.com).



Another little bit of advice is that many people now use their smart phones as their calendars. They also use their phones as their social links, their web surfing and just their main way to kill time. If your organizer or calendar are in the same place as your social life than the two will inevitably get intermixed. So, keep a separate calendar either online or physical in the form of a notebook. Keep these separate so that when you want to work you won't be thinking of all the other things on your phone!

6. Don't talk too much but definitely talk!

If we don't listen to students we won't figure out whether they understand things or not. The corollary is, if we don't proactively seek out and engage students we never give them a chance to explain, justify and evaluate their own understanding. Discussion is an essential part of teaching and learning and at the minimum, its use is twice as effective lecturing and taking notes.

No only will we not understand where they are having difficulties but rather there is a much bigger issue. If a student can't explain things verbally, it will be difficult for them to communicate. We have few opportunities in our day-to-day lives to express the technical minutia and complexity of the concepts we learn in higher education. A good TA will let (require and create opportunities for) the student(s) do the explaining and the questioning. Asking questions so that students must expand verbally upon a concept to ensure understanding (see #3 above) is crucial for cognitive development. Moreover, peer-to-peer teaching has many advantages (de Sousa, 2006) and is the best way for students to learn. One important aspect of this is that when they have to explain a concept to a fellow student(s) they often are forced to confront their assumptions and/or generalizations about concepts.

'Don't talk too much', doesn't mean to leave the students to their own devices but rather if you can get students to explain things to each other than you won't find yourself talking a lot. You will inevitably have to correct and guide students towards clear and concise forms of the concepts at hand. So, you need to talk. You also should ensure that all students have similar expectations around the course work. This means explaining things clearly and concisely yourself! Take the opportunity to practice engaging students as well.

7. If you don't know the answer, find it out & follow-up with the student!

A critical sign that you care is responding to student questions. However, no one knows all the answers. So, when you're confronted with the compulsion to say, "I

don't know", try not to leave it at that but add, "I'll try to find that for you". And then make sure that you follow-up. Either email the student, get back to them the next week or post the question/answer on the course website or discussion board. Another important aspect to this is that when you go to the course prof, a fellow TA, the textbook, the web or wherever else you might find the answer, then you are modeling the professional problem solving that every student needs to be successful no matter they end up. If you opt for using a fellow TA, grad student or the prof you are also using the community around you and fostering a more dynamic and friendly environment. No one makes it alone in life these days, so, these interpersonal skills and this community mentality to problem solving is also crucial for future success!

8. Try to figure out what the students need, not only what you can give them!

Assuming your not struggling to keep up with the base material in your TA, the next step is actually figuring what the students need and where their assumption lead them a rye! We get comfortable and we mimic what we've experienced as students and as TAs (see #2 above). We are always limited by our own experiences and collectively a classroom full of students will always have a much more diverse set of experiences and understanding than we can fathom. Take each class as an opportunity to diversify and extend your abilities to explain concepts and make connections across courses, cultures and languages. Empathy (see #4) is essential. Figuring out where students are coming from and identifying incongruent logical steps is extremely difficult however, it is also a skill good teachers have. Once you're confident of the material, start trying to figure out the other areas where you can help them learn!

9. Take ownership of your space! Intrapersonal and physical alike!

This is one I appreciate more having experienced different classes in different spaces. Having a group discussion in an auditorium with fixed seats is very different than in across lab benches. When we think of teaching and learning, often we think only of the student and teacher. These two are important but they never occur outside of an physical environment. This space also includes a myriad of other students.

If you're not comfortable in your physical environment students will unconsciously (mostly) pick this up and it will erode your ability to facilitate any lesson. Take control physically of the space. Move chairs, tables, equipment as needed. If you need to have a discussion in a circle make sure everyone can see.

Same goes for samples that students are required to observe a experiment. Make sure every student can physically make that observation themselves.

Its not just the physical environment of a classroom. We often observe this fact, when a group of friends sit together. With familiarity comes trust and better discussion. Before students start in a new group, get them to introduce themselves to one another. Try to create opportunities where students are required to meet someone new or work with a different team. If you identify a student that knows a concept and can explain it well to you, than they can explain it to other students as well. Teaching others is the most effective way of learning (see advice #6).

These tips will help create an effective learning environment more so than traditional spaces, most of which were built during a time where the space wasn't considered an issue. Most of the new teaching facilities recognize the importance of space and have flexible rather than fixed seating options. If you're in these space experiment with them for yourself!

10. Students may not know as much as you want them too but they also learn a lot faster than you think they can!

At the risk of mis-interpretation, students may not have every detail on the tip of their tongue when trying to explain or apply a new concept but often they just need a couple details they've missed to keep working through a problem.

This means two things, students implicitly don't know everything but they often know many related things and simply haven't made the cross connection yet. Many students only require small nudges in the right direction, or slightly clarification on issues, and without a complete description they are able to create the connections for themselves. *Remember, just because they don't know 'A' doesn't mean they don't know the related idea/concept 'B'.* Its a delicate balance of giving *long* explanations versus *short* lessons so that students can progress with material.

That being said when it comes to new jargon (terms) its good to always repeat the definitions before starting into the full concept for at least a few lessons so that all students are moving forward with the same background. This means repeating definitions many times but then quickly moving into the complexity. If students don't remember a word you're using they are not fully going to understand the more complex context in which it is used. With practice and experience you'll learn to gauge the level of your audience and adjust the complexity of a topic at hand but the first step is figure out what the students may need (advice #8).