

Expectations

Understanding Your Role
Understanding Your Students
Being New to Teaching in the U.S.
Strategies for Difficult Situations

In Front of the Classroom

Clearer Presentations and Explanations
Improving Participation
Strategies for Difficult Situations

Guiding on the Side

Assisting in Laboratories and Studios
Managing and Facilitating Groups
Strategies for Difficult Situations

Collected Wisdom

Strategies & Resources from TAs for TAs

Eberly Center for Teaching Excellence
Carnegie Mellon University

Behind the Scenes

Grading and Providing Feedback
More Effective Office Hours
Strategies for Difficult Situations

In the Long Run

Benefits of Being a TA
Enhancing Your Teaching

Collected Wisdom

Strategies & Resources from TAs for TAs

About this Book

Teaching assistants play a wide array of valuable roles in education at Carnegie Mellon and, with approximately 1,000 TAs each year, students in many courses benefit from their contributions. This book provides practical insights from dozens of TAs and several faculty, along with research on teaching and learning, to make TAs' work with students more successful and more efficient. You should be able to use this booklet to prepare for teaching each semester and also to find helpful ideas or resources at any time during a course.

The strategies and concerns which are the core of this book came from a series of focus groups with TAs conducted in each of the seven colleges. Participants were invited based on both their department's recommendation and their interest in teaching. Because the contributors include first-time TAs, graduate students with experience in many courses, nonnative speakers of English, and experienced undergraduate TAs, the book offers strategies that should be useful to almost all TAs. We also invited written contributions and received valuable material from experienced faculty.

This collection of strategies is organized around what TAs reported as their concerns in the focus groups, so TAs' ideas are featured prominently. Except for editing for conciseness, their ideas are in the TAs' own words. To help you decide whether or how a strategy may apply to your situation, strategies are identified by the TA's department and accompanied by some elaboration about the rationale and details for effectively putting the idea into practice. The major sections represent the most common TA roles – which cut across departments – to encourage you to adapt ideas from other disciplines. Also included are strategies for difficult situations identified by TAs and checklists with supplemental information to help you assess your own teaching and to give you further strategies in an efficient form.

Finally, you may find that some of the challenges and questions you encounter do not have straightforward answers. If these brief summaries don't capture the essence or complexity of a situation you need to deal with, we welcome you to use the Eberly Center as a resource.

Hilary Schuldt, PhD,
Associate Director, Graduate Programs
Eberly Center for Teaching Excellence

I wish I had had
an experienced TA
tell me things
so that
I would not
have made
the mistakes
I've made.

Mathematical Sciences,
first-time TA

Collected Wisdom
Strategies & Resources for TAs
Rea Freeland, Ph.D.
©2007 Eberly Center for Teaching Excellence
Carnegie Mellon University
Pittsburgh, PA
All rights reserved

Foreword

Carnegie Mellon values student learning in all its forms and continually strives to produce a more effective learning environment for both undergraduate and graduate students. Knowledgeable and well-prepared TAs are essential to maintain the high quality of many of our courses because of their vital role in enhancing the learning process and contributing to the success of our undergraduates. This contribution is clear as TAs help first-year undergraduates to learn the intellectual and creative expectations of our university community in the introductory courses. Throughout the curriculum, students depend on and benefit from the dedication of teaching assistants who provide constructive feedback, ask thought-provoking questions, offer individual assistance, and support learning in many different ways.

Effective teaching also requires active communication between faculty and TAs to clarify the expectations to be conveyed to students and to ensure that various responsibilities are well defined. While different courses require different roles for TAs, all faculty who work with TAs have a special responsibility to maintain ongoing communication. Regular meetings and feedback are especially important in helping new TAs calibrate to faculty standards with respect to appropriate grading, pacing, and using examples.

Through their teaching experience, TAs have a rare opportunity to enhance their own learning and professional development. Whether or not a faculty career is the next step after graduate school, teaching offers a chance to develop valuable skills in areas such as leadership, organization, communication, and management, which will be assets for any professional path. Carnegie Mellon seeks to provide ongoing and comprehensive support for graduate students' professional development through dissemination of written materials like this book, as well as the seminars, individual consultations, and future faculty programs available through the Eberly Center for Teaching Excellence and through the many support programs offered by the Intercultural Communication Center and the Office of the Assistant Vice Provost for Graduate Education.

The Carnegie Mellon community benefits from a long tradition of teaching excellence and educational leadership. This book represents only a fraction of the experience and wisdom about teaching and learning which can be gleaned from conversations with experienced faculty. I encourage both faculty and TAs to continue the discourse about strategies to promote greater student learning.

Mark Kamlet
Provost

Table of Contents

About This Book	Inside Front Cover	Improving Participation	60
Foreword	1	Creating a Comfortable Atmosphere	
About Expectations	5	Strategies for Asking Questions	
Understanding Your Role	6	Balancing Control and Flow	
Clarifying Faculty Expectations		Which Students Talk?	
Relating to Students		Strategies for Difficult Situations	70
Balancing Approachability and Authority		When your students' backgrounds vary or are weak	
Problems with Authority: Sexual Harassment and Cheating		When you have to wait a long time for responses	
Understanding Your Students	22	When students have misconceptions	
Adapting to Different Student Levels		When students seem unprepared for class	
Responding to Individual Students' Needs		When you can't cover enough in class	
Helping Students with Significant Difficulties		When students in required courses seem disinterested	
Being New to Teaching in the U.S.	33	When you can't prepare adequately for class	
Language Strategies for Nonnative Speakers		When you need to explain a complex problem	
Adjusting to U.S. Students' Expectations		When the room doesn't fit the needs of your class	
Strategies for Difficult Situations	41	Guiding on the Side	77
When you are new and need more confidence		Assisting in Laboratories and Studios ..	78
When you are about the same age as your students		Asking Questions and Encouraging Independence	
When you don't know an answer		Preparation Advice	
When students disrupt class		Managing and Facilitating Groups	83
When friends are in your class		Providing Structure and Feedback on Projects	
In Front of the Classroom	45	Facilitating Groups in Class	
Clearer Presentations and Explanations	46	Strategies for Difficult Situations	91
Focusing Students' Attention		When you are new to a complex lab course	
Selecting Examples		When some TAs are not prepared for lab	
Approaches to Coverage		When there is conflict within groups	
Appropriate Pace and Level		When the grading criteria are defined by others	
Reviewing for Exams		When feedback is given to students publicly	
Preparation Advice		Behind the Scenes	95
		Grading and Providing Feedback	96
		Setting Standards and Criteria	
		Increasing Consistency Across Students	
		Communication Across TAs	
		Clear and Constructive Feedback	
		Responding to Student Writing	

More Effective Office Hours	106	Checklists	
Helping by Coaching		About Expectations	5
Preparation Advice		Questions to Ask the Instructor Up Front	10
Being Accessible and Approachable		Common Types of TA Responsibilities	11
Strategies for Difficult Situations	112	Preview of Key Teaching Goals and Strategies	14
When students request regrades		Learning Students' Names	17
When an anonymous grader's name is revealed		Classroom Conduct and Discipline	21
When you have to deal with possible academic dishonesty		Questions to Ask on a Student Information Sheet	26
When you don't agree with the professor's criteria		Responding to Student Diversity	29
When students' work is ambiguous or incomplete		Supporting Students Who May Need Help	32
When an unprepared student comes to office hours		Support for International TAs	40
When some students seem to take advantage of you in office hours		In Front of the Classroom	45
In the Long Run	117	Environment, Speech and Board Use	50
Benefits of Being a TA	118	Preparing for the First Class	58
Increasing Your Efficiency		Preparing for a Guest Lecture	59
Dealing With Tensions		Better Questioning and Responses	65
Time Savers		Guiding on the Side	77
Adapting to Different Faculty Styles		Being Proactive in Lab	82
Enhancing Your Teaching	125	Tips for Students on Effective Group Meetings	86
Seeking Models and Mentors		Using Group Learning Activities in Class	90
Finding Your Own Style		Behind the Scenes	95
About Teaching Resources	131	Tips for Effective Grading and Commenting	104
Frequently Asked Questions	132	Sample Criteria for Student Papers	105
Support for Teaching and Professional Development		Getting Students to Your Office Hours	111
University Logistics and Procedures		In the Long Run	117
Laws and Policies Relevant to Teaching		Where Might You Save Time on Teaching?	124
Support for All Students		Support for TAs and Future Faculty	128
Contact Information for Key Resources	140		
References	141		
Acknowledgments	142		



Understanding Your Role

The purpose of this chapter is to give both new and experienced TAs an overview of common TA roles and responsibilities and to help refine their understanding of what is expected of them.

Teaching assistants work in many different settings including recitations, discussion sections, laboratories, studios, project meetings, computer clusters, review sessions, and office hours. Most TAs also have the important responsibility of grading and providing feedback on students' work. Over a few semesters, you may move from leading a section in an introductory class to facilitating projects in an advanced course, from discussing problems in review sessions to assisting in lab, or from being a TA to teaching a summer course on your own. The particular combinations of responsibilities given to a TA can vary substantially among courses, but in all cases TAs make essential contributions to the high quality of Carnegie Mellon's educational environment.

- In large multi-section courses, TAs help students to learn more actively and to have greater access to assistance and individual attention.
- In laboratories, studios, and project courses, TAs provide ongoing guidance and feedback for complex work-in-progress while helping students to develop independence in their critical thinking and creative work.
- In office hours, TAs listen to students' concerns, ask probing questions, explain complex concepts, and respond to varied individual needs.

- In many courses, TAs provide students with fair and reliable evaluation of their work, including comments to help them improve their understanding and performance.

Because TAs play different roles in different courses and because TAs themselves have such diverse backgrounds (e.g., attending undergraduate institutions where they never had a TA, having undergraduate majors in fields different from what they now teach, or attending schools where the cultural expectations are different from the U.S.), it generally takes time and effort to understand this new set of responsibilities. The purpose of this chapter is to give both new and experienced TAs an overview of common TA roles and responsibilities and to help refine their understanding of what is expected of them.

To be effective in varied roles, TAs learn to manage working relationships both with faculty and with students. Faculty rely heavily on their TAs to improve communication with students about all types of course-related concerns, so the TA may act as a liaison who identifies and reports students' needs or as a filter who responds to many questions for the instructor. Students rely on TAs to clarify course material, to interpret course policies, and sometimes to provide guidance about how to cope with the stresses of student life. Juggling the different expectations of faculty and students is central to a TA's success.

Clarify your responsibilities with the faculty member at the beginning of the course.

Clarifying Faculty Expectations

It's good to know what the professor expects of you. Sometimes that information is hard to get.

Chemistry, three semesters as a TA

The recommendation emphasized most by experienced TAs is to make sure that you clarify your responsibilities with the faculty member at the beginning of the course. Faculty members are not always aware of the varied expectations and work styles TAs encounter, so some may inadvertently assume that the expectations for their course are "standard." The truth is that little is standard across courses, so you generally need to take the initiative and ask questions.

Many instructors meet with their TAs during the week before classes begin to discuss their expectations. In this conversation you can discuss your interest in the course and establish your commitment to making the course go smoothly. Some faculty view the TA's role as a "colleague in training." As a result, they may discuss their course plans with you in detail and invite your opinions about some decisions. Other faculty have a well-established method of teaching a course and see their responsibility more as that of a manager or supervisor with a clear job description for you. A few do not plan the TA's role in detail and expect you to ask

questions to clarify your responsibilities. The checklist on page 10 should help you to ask the right questions; the one on page 11 describes several common TA roles in some detail to give you a starting point for thinking about what might be expected.

One of the key decisions in many courses is whether or not you should attend lectures. Many experienced TAs and faculty view attendance as valuable for TAs, especially for recitation or discussion section leaders. Other faculty may view lecture attendance as optional if you have excellent communication about the course content, such as through shared notes and regular meetings, so that the students perceive the course as a unified whole. The views of several TAs below describe factors they consider in deciding how important lecture attendance is.

It's a worst-case scenario not to know what the professor is emphasizing. I've wasted whole recitations emphasizing things that the professor didn't even care about. (Physics)

In most recitation or discussion sections, there is more than enough material you could teach. Your goal is to prioritize. In order to select the most useful material, you need to know what concepts and skills the professor values most and emphasizes in the course. The best TAs reinforce the course goals clearly and help students know what is expected of them for good performance in the course.

Attending lectures helps you judge where the professor is, his/her teaching techniques, and what the students may not understand. It also helps you to think "on that level" again and get used to how the professor words things. (Chemistry)

The students get used to seeing your face. (Mechanical Engineering)

The more students see you, the more likely they are to view you as approachable. If you don't have a lot of student contact in class but do hold office hours, regular or occasional attendance is especially useful.

Know the timetable of the syllabus, but in real time. That way if the professor doesn't cover something, the TAs know. Otherwise, everyone might make the assumption that the other person is covering it. Students pick up on this easily, so the lecture and the recitation should not come across as two separate courses. (Physics)

You can cut down on extra preparation time by going to lecture. (Chemistry)

If you can attend lectures, you don't have to read the text as carefully. You know which material was discussed in depth and which was not. You have more information with which to decide quickly where students seem to have questions and where you need to devote your efforts.

I often can't go to lecture, but what I do is talk often with the professor. It is amazing the communication that I've had with my instructors – formal TA meetings and getting the class notes in my mail box after every lecture. It's almost the same thing as going to lecture. What is important is knowing what is going on in lecture, however you can do that. (Physics)

Attend the lectures (or look carefully at the instructor's class notes) so that you know how the instructor covers the subject. For example, it is important – particularly for first-year and sophomore courses – that the notation, jargon, and nomenclature used in the recitations or tutorials be consistent with that used in the lectures and textbook.
(Mechanical Engineering, faculty member)

Consider asking faculty members about the most efficient and effective ways you can fulfill your responsibilities. In many courses, attending class or having copies of lecture notes will save you time in preparation and enhance your work with students in recitations, reviews, and office hours.

In the unwritten graduate student code, you never go to classes.
(Civil and Environmental Engineering, TA in upper-level courses)

Some faculty may advise you not to attend classes when you have recently been a student in a class very similar to your TA assignment and know the material thoroughly.

If you want to negotiate some aspects of your role, you need to know the amount of time your department expects you to devote to your TA responsibilities. If you were not given an expected number of hours in a departmental orientation, you may need to ask the appropriate faculty member in your department for the official policy (usually the associate department head or the person who makes the TA assignments). If a professor's expectations are unclear, take care neither to promise more than you can do in the expected time commitment nor to offer more suggestions than the professor seems to invite.

See page 10 for more ideas about adapting to different faculty styles.

Checklist: Questions to Ask the Instructor Up Front

- ✓ **What are the main course goals?**
Are some of these goals more important than others for the work I'll do with students as a TA?
- ✓ **What will my responsibilities as a TA be?**
(A more complete list of possible responsibilities is available on request from the Eberly Center.)
 - attending lectures
 - attending weekly TA meetings
 - drafting or revising grading keys
 - providing written feedback (individual comments, detailed solution sets)
 - reporting on common student errors or difficulties
 - preparing quizzes, handouts, assignments, exam questions
 - holding regular office hours
 - conducting review sessions before exams
 - giving guest lectures (as needed or as a learning experience)
 - maintaining grade records
 - giving a percentage of the final grade based on activities in section meetings
 - recording attendance
 - proctoring exams
 - maintaining on-line resources for students
- ✓ **What do you expect the students to know or be able to do from prior courses?**
If you expect wide variation in students' backgrounds, is there anything specific I should do in response (e.g., offer tutoring, conduct review sessions, find extra "challenge" problems)?
- ✓ **How much will I interact with students?**
Will students be expected to attend section meetings, participate actively in recitation/discussion, seek help with assignments out of class, or attend help sessions? If section meetings are optional, how can students be encouraged to attend?
- ✓ **How often will we meet to discuss the course?**
If there are multiple TAs, will we meet to discuss how to coordinate our activities?
- ✓ **How many hours, on average, should I expect to devote to this course?**
How much will that fluctuate over the semester?
Do you have any suggestions about how I can be most efficient?
- ✓ **What are the criteria for grading in this course and how can I be sure my grading is calibrated properly to your standards?**
For example, how should partial credit be awarded?
To what extent is collaboration allowed or encouraged?
How will the final grades be determined?
- ✓ **About what policies, if any, do I have authority to make decisions and for what issues do you want me to refer questions to you?**
 - requests for regrading
 - granting an extension
 - accepting late assignments
 - giving a make-up quiz
 - responding to suspected cheating or plagiarism
 - helping a student find additional assistance for personal or academic problems
- ✓ **How much flexibility do I have in how I fulfill my responsibilities?**
What aspects of my teaching are important to maintain consistency across sections or to fulfill specific course objectives?
- ✓ **In what ways will my work be evaluated?**
Will I receive feedback from you and/or students about my performance?
 - faculty review of graded exams or papers
 - classroom visits and feedback
 - videotaping and review
 - early or midterm course evaluations
 - end-of-course student evaluations via Faculty Course Evaluations (FCEs)
 - end-of-course student evaluations specific to TA responsibilities

Checklist: Common Types of TA Responsibilities

- ✓ **Lead recitation sections:**
Review main points and/or difficult parts of lectures; discuss examples in detail; respond to questions about homework; may create and give quizzes; often grade, hold office hours and conduct review sessions; attend TA/staff meetings to coordinate activities across sections.
- ✓ **Lead discussion sections:**
Discuss key course concepts based on assigned reading, writing, or in-class exercises; guide students on writing assignments; may create and give quizzes or homework; typically grade and hold office hours; attend TA/staff meetings to coordinate activities across sections.
- ✓ **Assist in laboratories:**
Monitor ongoing student work in technical courses; respond to questions about experiments, methods, equipment, and software; ensure student safety; may give brief pre-lab lectures; often grade lab reports.
- ✓ **Assist in studios:**
Monitor ongoing student work in fine arts courses; respond to questions about projects, exercises, techniques, or software; assist with desk critiques, pin-ups, or other face-to-face feedback; may create assignments.
- ✓ **Grade:**
Follow criteria provided by the professor; often create grading keys for homework; may collaborate on creating grading criteria for exams, papers, computer programs, and projects; provide constructive comments on individual students' work; prepare detailed solution sets for homework; may assist students in office hours, review sessions, or computer clusters.
- ✓ **Supervise group projects:**
Meet with project groups in or out of class; guide students' choices of approaches; assist in providing feedback on intermediate stages of the project; provide information on useful resources; may be involved in grading final projects.
- ✓ **Hold office hours:**
Be available regularly and by appointment to answer students' questions about course material; contact students who are having significant difficulties to offer assistance; may provide tutoring for students whose backgrounds are weak in key areas.
- ✓ **Conduct review sessions:**
Summarize major concepts; answer students' questions as regular review or prior to an exam; may prepare a written review sheet for exams or present a summary of the most important points; may provide students with supervised practice answering exam-like questions.

Relating to Students

Talk to the students, not just at them.

Physics, three semesters as a TA

Teaching for the first time or simply beginning a new type of TA assignment often raises questions about how to relate to students. Many TAs are concerned about coming across to students as knowledgeable, confident, and in control. It is natural to wonder about what the students will expect from a TA:

- Do I have to be an expert?
- Do I have to be able to answer all of their questions?
- Will they respect me?

These concerns focus on the TA's roles as a source of information and manager of a learning environment. While knowing the material and preparing thoroughly address these initial questions to a large extent, focusing only on these issues may lead you to view the TA-student relationship in a limited way. Successful TAs are able to build effective working relationships with students in which they know what students need in order to learn effectively. Additionally, they communicate directly with students about their concerns and expectations and listen carefully to students' concerns. To maintain a broader perspective, it can help to recall information of interest to students when meeting a new instructor or TA:

- Is this person interested in my learning?
- Is this class going to be engaging?
- Will I be comfortable in this class?

In general, a good goal is to prepare so that you come across as organized, enthusiastic, and responsive to students' concerns – characteristics that course evaluation research has shown are important to students. This combination of goals addresses students' needs for clarity in your explanations, an environment that motivates them, and recognition of the class as a group of individuals who sometimes have different needs. The checklist on page 11 previews key teaching goals in more detail to help you understand both cognitive and motivational dimensions of student learning. These goals represent issues that are addressed throughout this book.

A common problem among many TAs and new instructors is focusing too much on how they teach and not enough on how students learn, an imbalance that can result in a one-way pattern of communication and little adjustment based on students' input or performance. Being responsive to students' needs involves seeing them as individuals whose lives are often complex and who – simply because of human nature – can't be perfectly

The checklist on page 14 previews key teaching goals in more detail to help you understand both cognitive and motivational dimensions of student learning.

efficient “learning machines.” Of course, you also need to maintain a learning environment where students understand your expectations so that everyone is treated fairly and knows what they can do to learn and succeed in the course. The following is what an experienced TA and faculty member suggest as general guidelines for keeping a balanced perspective in relating to students.

Be enthusiastic about teaching. Try always to give the benefit of any doubt to the students. (Physics)

Giving the benefit of any doubt to students is one of many ways of showing respect for students as learners. It is more respectful to start from the assumption that students are making their best effort than to give in quickly to negative or low expectations. For example, when someone asks a question about old material, try not to answer, “We went over that last week,” which could imply that students weren’t listening or should have understood that material already. Instead, try to explain the material in a new way in case the first attempt wasn’t clear enough.

Professors and teaching assistants can borrow from what research has shown to be the most effective parenting style across many cultures.

The Authoritative Style (Baumrind, 1991) combines both warmth and responsiveness with clear, consistent structure to promote the development of a trusting relationship and responsible behavior.

(Psychology, faculty member)

Students of any age are most comfortable when they understand the expectations in a course. When they understand the structure and the consequences for ignoring requirements and deadlines, students are better able to take responsibility for their actions within the framework of the course. When you can look beyond the structure to respond to individual students’ needs, they trust that you are concerned about them as individual learners. Thinking about good parenting styles can remind you not to be too authoritarian and rigid when you are responsible for knowing and enforcing course policies.

Pages 41-44 include strategies for difficult situations related to many of the issues above. Further strategies for working effectively with students, including adapting to different student levels and responding to diversity, are in the next section on “Understanding Your Students” on page 22. If you already know what your teaching assignment will be and are preparing for the first class meeting, the checklists on pages 21 and 50 offer some steps to help you get to know your students and start the course well.

The Eberly Center seminars on student cognition and motivation are offered twice per year. A seminar on getting started as a new TA, which deals with many of the issues above, is offered one to two times per year.

If you already know what your teaching assignment will be and are preparing for the first class meeting, the checklists on pages 21 and 50 offer some steps to help you get to know your students and start the course well.

Checklist: Preview of Key Teaching Goals and Strategies

Highlight important information

- ✓ Use clear cues such as pointing to key information on the board or using phrases such as “On the exam, everyone should be able to...” to get students’ attention.
- ✓ Write down major ideas as well as say them, or paraphrase main points, so that students have a chance to learn them in a couple of different ways.
- ✓ Use periodic summaries to allow students to check their understanding of the most important points at the end of a section of class.
- ✓ Tell students directly what they are expected to be able to do with the course material on assignments or exams in order to help them test themselves.

Make information meaningful

- ✓ Explain new material in relation to students’ prior knowledge (or possible misconceptions) from previous courses or from everyday experience.
- ✓ Ask questions that require comparisons and elaborations to help students see how new information fits into what they already know.
- ✓ Show relevance to students’ long-term professional goals and/or personal interests.

Organize information

- ✓ Highlight goals and subgoals in problems or emphasize hierarchies and parallels in complex concepts to help students recall the ideas in appropriate contexts.
- ✓ Distinguish clearly between similar concepts and between related problem types.
- ✓ Remind students of “the big picture” of the course and how each concept or skill is related to the larger goals they are trying to accomplish.

Check and refine students’ understanding

- ✓ Ask lots of questions so that you know what students know and where they need more instruction.
- ✓ When possible, provide feedback as they work to help students incorporate new information in their thinking.
- ✓ Help students identify when you are presenting material to be mastered as a foundation for the rest of the course or when you recognize common misconceptions that can be hard to unlearn.

Promote transfer and generalizability

- ✓ As time permits, expose students to multiple examples so that they learn to generalize concepts and skills across different contexts and applications.
- ✓ Relate course material to a variety of long-term goals for the types of careers you expect them to pursue.

Balancing Approachability and Authority

A complex issue for TAs and instructors is how to find a good balance between being friendly and approachable while also being sufficiently authoritative and managing the learning environment effectively. Your approach should depend both on your personality and your students' maturity. Just as you wouldn't want to be "buddies" with first-year undergraduates who need you to provide structure for them, you wouldn't want to be overly authoritative with advanced students who primarily want you to guide them in pursuit of their own goals. Many TAs find it useful to distinguish between being friendly and being friends with students. Friendliness is important for students to show students that you truly want to help them and care about their learning. However, being friends with students can create the expectation that you will be their confidante and ally in a way that compromises your objectivity and fairness. Here are some additional guidelines that experienced TAs find useful.

Many TAs find it useful to distinguish between being friendly and being friends with students.

When you start to teach, you have a tendency to help students out to give a good impression. But seasoned TAs set the standards and rules at the beginning of the course and do not make exceptions unless it's an emergency. (Heinz School)

Many new TAs are uncomfortable with enforcing policies and deadlines, especially when having authority is a new experience for them. If helping one student requires bending rules and putting other students at a disadvantage, you can remind yourself and the student that consistency is important for fairness.

Something I wish I had done sooner is to clarify my credentials to help establish my authority. It took me a couple of semesters to realize it. I thought it would be neat to empathize with students, but it turned out to sort of shake their faith. Crudely speaking, I now act as if I know everything and it works a lot better.

(Heinz School, TA for mid-career professionals)

Students appreciate a TA who can understand their concerns, but they don't want you to be too much like them. Especially if you are teaching other adults in graduate and professional programs, you need to tell them what experience (work or educational) you bring to the classroom that will help them.

I find myself drawing a line between sometimes casually talking with people before class and sticking to strict question/answer stuff. If you can be authoritative with regard to the material without being a "bad guy," it helps. If you're going to be authoritative on everything, that's another story. You have to sound like you know what you're talking about on the core material at all times. (Psychology, undergraduate TA)

A significant part of maintaining your authority while being friendly is being knowledgeable and prepared. You may find it helpful to be “all business” at the beginning of a course to establish your role and then become more casual as students increasingly see you as helpful. Note that if you prefer to maintain the more formal style, students still appreciate some flexibility and a friendly smile in class so that they know you will be understanding if special problems come up.

Learn and use students’ names very actively in class. Call on students by name. You’ll be able to select individual students, such as after class, whom you know are having problems. You can talk to them in a personable, not stand-offish way. Knowing a name and a face goes a long way toward doing this. (Physics)

The checklist on page 17 describes some strategies to help you learn names more effectively.

Using students’ names can make the classroom atmosphere noticeably friendlier and more relaxed, thus making you more approachable. It also enables you to show concern for individual students’ learning when you can relate questions in class to their written performance. The checklist on page 17 describes some strategies to help you learn names more effectively.

Know the course policy front and back. If the policy is undefined in some area where students have questions, say that you’ll get an answer for them. (Chemistry; Biological Sciences)

It is important not to give wrong answers about course policies. Errors in this area significantly undermine your credibility with both the students and the professor.

Note that if you are unlike most of your students in noticeable ways (e.g., a nonnative speaker of English, a woman in a technical field, a relatively young graduate student teaching mid-career professionals), you may want to seek further advice about how to balance approachability and authority from others who have been successful in similar situations. For example, some students may inappropriately expect that women will be especially gentle or accommodating or that nonnative speakers of English will be hard to talk to. The Eberly Center can help you find contacts with similar experience with whom you can discuss strategies.

Checklist: Learning Students' Names

- ✓ **Use name tents.**

You can ask students to write their names in large letters on both sides of a folded 5 x 8-inch index card and to keep this card on their desks for the first few classes. Particularly in classes where you want to use students' names frequently, name tents can help everyone in the room to become familiar with one another and make it easier for them to address each other directly.
- ✓ **Use a seating chart for the first 2-3 classes.**

You can ask students to sit in the same place for a few classes to help you learn their names more quickly.
- ✓ **Use a photo roster.**

You can obtain a photo roster of your class to help you associate names with faces. See "How do I get a copy of the class roster?" on page 134.
- ✓ **Annotate your class roster.**

When you meet the class for the first time, take a few extra seconds to identify 1-2 of each student's most striking features – either outstanding physical features or other noticeable traits. Be sure to include ways of pronouncing names that are unfamiliar to you.
- ✓ **Learn a few names at a time.**

Be sure to study the roster between classes. Some instructors use the time just before and just after class to learn 5-10 names per class. Others invite students to their offices in small groups to learn a little about them in addition to their names. Both of these approaches reinforce that you are interested in individual students and their learning.
- ✓ **Ask students to write something about themselves.**

In addition to information about related course work, you might ask students to tell you something to make them and their names more memorable. Where they are from, what they like to read or do for fun, or their long-term goals can help you distinguish individuals more easily.
- ✓ **Ask students to introduce each other to the class.**

Give students 2-3 minutes in pairs to interview each other and discover something that "no one can forget." Go around the room asking students to introduce each other, allowing about one minute per pair.
- ✓ **Use mnemonics.**

Many name-face mnemonics depend on associating the person's name with a physical feature. Often by using visual images, you can relate the name (or key words with similar sounds) to something more meaningful and concrete. For example, a tall, thin student named Creighton Rosental can be visualized carrying a large crate of roses on his head.

Problems with Authority: Sexual Harassment and Cheating

The students really listen to you and see you as the authority aside from the professor. Sometimes they even accept what you say above what the professor says.

Chemistry, six semesters as a TA

Learning to handle authority gracefully is an important part of being an effective TA. It takes a little time for most TAs to become comfortable with having the authority that comes with conducting classes and assigning grades. The checklist on page 21 offers many strategies for handling key situations in class. However, the difficulties come in different forms for different people and some of the difficult situations don't happen in the classroom.

Even though it may be hard to believe while you are still a student yourself, you actually do have power as a TA. Without sufficient awareness of the power differential between TAs and students, some TAs put students in very uncomfortable situations. For example, if you initiate a friendship with one of your students and begin to confide in him or her, the student may feel that it isn't okay to walk away when you want to talk or socialize. If a student believes that his or her evaluation in the course depends on staying on your good side, the student may feel trapped by any expectations that go beyond successfully completing the course work.

Remember that it is impossible to have a relationship of equals between a student and a TA (or between a TA and a professor) and the illusion that your situation is "different" should be treated as a warning sign of potential problems that you should discuss with someone you trust. Note, however, that students do not always understand the power differential and you have to be the wiser person in navigating potentially awkward interactions and avoiding compromising situations.

I had a difficult situation with a woman in my class. If you get the feeling that someone wants a personal relationship with you, be wary. Step off. Act disinterested. (Mechanical Engineering)

Since your students may be close to you in age and may view you as very friendly and approachable, you may find some of them want to be close friends or to date you. Keep in mind that you will lose your objectivity about these individuals and may be open to accusations of bias whether or not the friendship or relationship works out. You need to keep enough distance in your interactions with students to avoid temptations or tensions in this area, which means never dating or becoming close friends with a student currently in your class.

Remember that it is impossible to have a relationship of equals between a student and a TA.

On the other hand, you might become concerned that something happening to you, as a student or as a TA, could constitute sexual harassment. If that happens, you can contact a sexual harassment advisor for confidential assistance. See page 137 for policy and contact information.

While it is important not to overstep boundaries like those above, sometimes TAs are not confident enough in their authority to carry out certain responsibilities. A significant problem occurs when TAs shy away from possible incidents of cheating and plagiarism. Since TAs play a central role in grading and evaluating student work, TAs are also often the first to recognize that a student may be copying another student's work, plagiarizing large excerpts of a paper, or faking data for a lab report. Students always have the right to contest what they may view as an unfair accusation, so it is understandable that some people want to avoid initiating any discussions that could lead to an uncomfortable dispute. When TAs are reluctant to mention their suspicions, students don't have the chance to develop high standards of academic integrity.

Even though it can be difficult to take on the responsibility of reporting suspicious behavior, you do have this power and the university community benefits greatly when you use it well. You need only report your concerns and evidence to the professor. The decision of whether to respond to a suspicious observation with a formal disciplinary action or to simply talk to the student about the situation belongs to the professor. It is a good idea before the course begins to ask the professor about what he or she considers to be inappropriate "borrowing" from other students or other written sources so that you can act accordingly if an inappropriate situation regarding plagiarism arises. Also, if you will be proctoring exams, you probably want to discuss what actions the professor considers appropriate to prevent cheating in that setting (e.g., making a seating chart, standing at the back of the room, separating students whose behavior causes you concerns, not allowing calculator sharing). Experienced TAs offer their perspectives below, and further strategies for dealing with possible academic dishonesty as a grader are on page 113 and more about official university policy is on page 136.

You should realize that cheating can look like an attractive option to your students. (Engineering and Public Policy)

While it is wise to exercise caution in making serious accusations, you should feel able to talk with the professor about even the smallest concerns so that he or she has the opportunity to take a proactive approach. The professor can advise you on how to handle such situations effectively. For example, simply noting a questionable act in a descriptive and non-accusatory manner in your written comments is often enough to show a student that cheating or plagiarism will be noticed and will not be tolerated.

Even though it can be difficult to take on the responsibility of reporting suspicious behavior, you do have this power and the university community benefits greatly when you use it well. **You need only report your concerns and evidence to the professor.**

Section 1 About Expectations

Dealing with plagiarism is often touchy. Teaching students about how to appropriately borrow from other sources – an important skill – is still very hard. I try to be very explicit about how it's okay and in fact good to cite from actual sources to make an argument in their writing. But they must do their own work and their own thinking, too. I also try to be explicit about how and when students should work together. I don't want to discourage group work, but sometimes it's not appropriate.

(History)

Defining plagiarism early in a course is essential. Keep in mind that students may not understand what types of evidence or citations are considered appropriate in your course (especially if it is their first course in that discipline) and they may err out of naïvete rather than lack of integrity. Clear initial guidelines prevent more serious misunderstandings later.

Make sure you and the professor are on the same page with regard to collaboration. (Engineering and Public Policy)

Students are often confused by different expectations in different courses. You can help to clarify and remind them of the policy in your course by talking about it shortly before the first assignment is due. Discuss what kinds of information they can share and what they cannot, e.g., they can discuss ideas but not show each other written work.

Checklist: Classroom Conduct and Discipline

Classroom Techniques from Dr. Hugh Young

Setting the tone in class

- ✓ **Start and end each class decisively.**
“OK, let’s get started.” “That’s all for today.” And so on. Never run on past the end of the period.
- ✓ **Learn how to deal with disruptions when you need the attention of the whole class.**
See “When students disrupt class” on page 44.
- ✓ **Expect noise at times.**
Sometimes chaos can be useful, such as when you pose a question and students need time to mull it over and discuss it among themselves.
- ✓ **Don’t give too many military-style orders.**
Expect students to question your requests at times and be prepared to explain the goals and rationale for what you ask them to do. Student respect has to be earned through ability, not position or rank.

Maintaining professional conduct

- ✓ **Don’t try too hard to be a buddy to your students.**
You are on their side, and you want to help them, but you and they are not equals. Being buddies usually increases the likelihood that students will test your authority directly or indirectly.
- ✓ **Be careful in your use of language.**
Avoid carefully any language that is vulgar, profane, suggestive, or sexist, even though you may think all your students talk the same way.
- ✓ **Tell students emphatically that you will not tolerate cheating, and do everything you can to prevent it.**
Watch for copying on homework assignments. Proctor quizzes and exams diligently, and report instances of suspected cheating promptly to the supervising professor.
- ✓ **Be extremely prudent in social relationships with students.**
Avoid any emotional or sexual involvement that would provide any basis for questioning your objectivity.



Understanding Your Students

One of the central characteristics of effective teaching is that the instruction is tailored to the needs of the students.

In addition to understanding your role in the course, you need a clear understanding of your student audience. Instructors and TAs find these types of information about students useful:

- What background knowledge do students have that is relevant to the course?
- What might students find interesting about the course?
- What types of classroom interaction might different students prefer?

Finding this information can be a significant challenge because of the diverse academic and sociocultural backgrounds of the students. Talking with faculty and experienced TAs is very helpful to get baseline information to calibrate your expectations. Especially for upper-level courses in the major, faculty and experienced TAs can tell you how well prepared most of your students will be and what kinds of difficulties students have encountered in the past. For introductory-level courses, it is useful to ask what is taught in subsequent courses so that you can prepare and motivate students effectively. You may also want to ask faculty about the concurrent courses that students take and how they relate to your course.

In addition, for most courses (especially those with first-year undergraduates or those with a mix of students from across disciplines) you should also gather information directly from students. Teaching a mix of students from different academic backgrounds requires faculty and TAs to think carefully about how to meet the needs of different groups. The checklist on page 26 offers some questions you might ask students in the first class to get a more accurate picture of your students' backgrounds, needs and interests. Issues of adapting your pace and level are addressed on pages 53-54.

Adapting to Different Student Levels

One of the central characteristics of effective teaching is that the instruction is tailored to the needs of the students. But how can you adapt to different student needs when every group of students is diverse and some classes are too large to get to know each person? Both experience and educational research provide some information about what different groups need. (A useful resource on this topic is *Best Practices for Teaching First-Year Undergraduates: Strategies from Experienced Carnegie Mellon Faculty*, which compiles a wide variety of strategies for teaching this audience. You can get a booklet from the Eberly Center or download the PDF from the Eberly website.) Experienced TAs have made the following observations, which research corroborates.

First-year undergraduates

Freshmen aren't expecting to think that hard. They're looking for right answers and concrete material. (Social and Decision Sciences)

First-year undergraduates often don't realize that new kinds of analytical and critical thinking are expected in college. While recall of facts and straightforward application of procedures was all that they needed in high school, they may need your patience and support when they learn about new ways of thinking.

A lot of the class is review for the students early on – so I would always have to add some problems at the end of the section that they didn't know. (Mathematical Sciences, undergraduate TA)

Some of the introductory courses begin with material that students have seen in high school. Some students will be bored by the review and others will need the review but not realize it. Including some challenging problems in each class can help to keep all of the students engaged and to ensure that first-year students are not disproportionately confident of what they know.

Freshmen seem much less apt to come to my office before an exam than upperclassmen, even if it is just to clear up a small confusion. (Chemistry)

An Eberly Center seminar on teaching first-year undergraduates is offered one to two times per year. For the current seminar schedule, visit www.cmu.edu/teaching/.

See page 111 for suggestions about getting students to come to see you.

You may need to be more assertive in helping first-year undergraduates to know when they need help because many have not needed assistance before. Also, students who have always been successful often think that they shouldn't need help and may be embarrassed to come to see you.

I try to take note of quiz scores and chat with students to make sure they're making progress. (Chemistry)

Because first-year students often do not recognize when they need extra help, it is useful for TAs to monitor their homework and/or quiz scores to make students aware of potential problems early in the semester and encourage them to ask you questions or talk with you about study strategies.

Introductory vs. upper-level courses

It's hard for graduate students to remember being in introductory courses, but the students in these classes really need repetition of the major points. They also need to have the connections between topics and themes stressed and stressed again. (Statistics)

A key role for TAs is providing emphasis on the major ideas. In introductory courses that survey large numbers of concepts, students particularly need your help in seeing the larger issues that bridge topics. You can stress these connections during class with strong introductions and periodic summaries of main points.

My preparation is very level-dependent. For freshmen and sophomores I use lots of examples. With upper-level students I use fewer examples, but explore them in greater depth. Even though advanced students need fewer examples, it can be more challenging to teach them because they're more qualified and, in some ways, more demanding. They demand a higher quality course, which causes me to spend more time working on my performance, on the little details that the freshmen don't notice or expect to be perfect. (Statistics)

Master's-level students in professional programs

You have to understand the culture, your role as a TA, and the customers that you cater to. Feedback to students shouldn't be too negative. You have to be very suave about giving negative feedback. (Tepper School of Business)

Assisting in graduate courses means adjusting to an environment where students are graded on an A/B scale and almost everyone views themselves as an A student based on past educational and professional success. Thus, they are very sensitive to grading procedures. Feedback in this environment has to focus on exactly how the work met the stated grading criteria and how it could have been more effective. A constructive tone, rather than a harsh one, is essential.

One thing I've noticed is that if you give them theory and specific examples, how this ties to industry and their upcoming job hunt, they are more attentive and motivated. With the master's students, you need to tell them each thing has a real-world application and give a couple of examples of why this is important in the past and in the future.
(Tepper School of Business)

Providing examples that have workplace relevance is one of the best ways to motivate adult professional students and to build your own credibility as an authority.

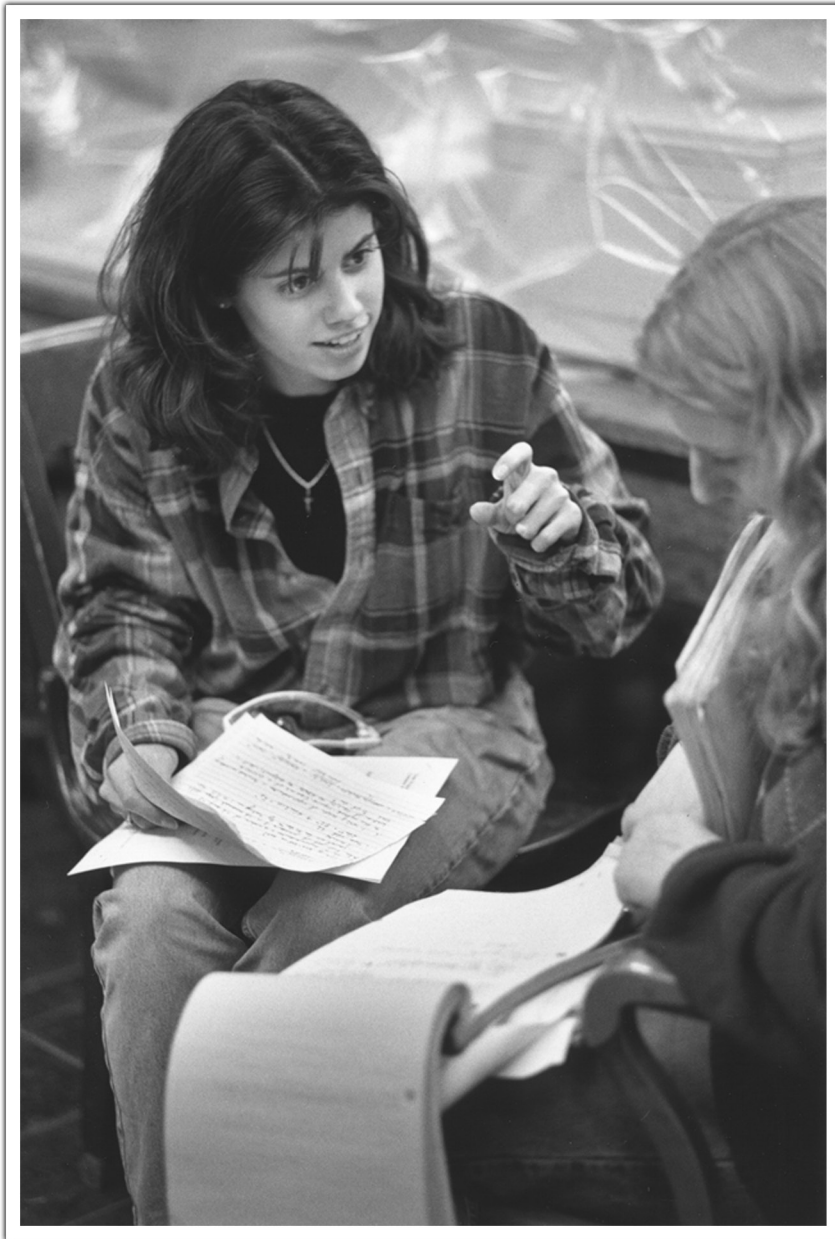
The evening students have different requirements. One is their time constraints. You need to be willing to work on weekends. Second is they require a different way of interacting. They have more experience. You need more of a forward style. You need to be more applied.
(Heinz School)

The checklist on page 26 offers some questions you might ask students in the first class to get a more accurate picture of your students' backgrounds, needs and interests.

Checklist: Questions to Ask on a Student Information Sheet

- ✓ **Name.**
To make name learning easier, you may also want to ask students to give information about how to pronounce their name if they think it is tricky. See page 17 for more about learning names.
- ✓ **Class.**
First-year undergraduates require special attention since they are adjusting to many new expectations in a new environment. Various groups' special needs are also discussed in "Responding to Individual Students' Needs" on pages 27-29.
- ✓ **Major.**
Especially in required courses taken by students across the university, you can use information about students' majors to help you choose examples of greatest interest to your students. Adapting to your audience in this way is a potentially important motivational tool.
- ✓ **Reasons for taking this course.**
If many students are taking the course because of a requirement, it will probably be important for you to pay greater attention to strategies for motivating learning and performance (e.g., stating the relevance of course material to students' future goals or other interests). If you are TA for an upper-level or graduate course, the students' interests in the course may tell you a great deal about their long-term professional goals.
- ✓ **Related courses – present or past.**
This information helps you to pitch your explanations at an appropriate level, to use familiar terms, and to build connections across the curriculum. If you find that students' level of preparation varies greatly, see pages 53-54 and 70-71 for more information about appropriate pace and level and about when students' backgrounds vary or are weak.
- ✓ **Some personal background.**
By asking students about where they grew up, their non-academic interests, what they like to read, or their professional goals, you can gain valuable insights about what interests them and what styles of classroom interaction they may prefer. Such information also gives you ways of connecting with students as individuals and suggests topics for small talk and classroom humor.

An Eberly Center seminar on the dimensions of social and cultural diversity in the classroom is offered each semester. For the current seminar schedule, visit www.cmu.edu/teaching.



Responding to Individual Students' Needs

Regardless of how much research reveals about gender differences or cultural differences, the overall differences between groups do not necessarily tell you much about specific individuals. Since it is important to treat each student as a unique individual, one challenge is to use valid information about group differences while avoiding assumptions that are common but may be based on naive stereotypes. Because instructors and TAs may have little first-hand experience with many of the groups represented in their classes, a practical way to start is to develop greater awareness of the dimensions of difference that may matter while simultaneously and gradually accumulating knowledge of and experience with other cultures.

The checklist on the next page offers some general guidelines for responding to sociocultural diversity and specific suggestions for addressing common problems experienced by women, people of color, and international students.

The checklist on the next page offers some general guidelines for responding to sociocultural diversity and specific suggestions for addressing common problems experienced by women, people of color, and international students. While it can be challenging at first to try teaching methods that may be different from your own experiences and preferences, your willingness to work outside your “comfort zone” at times can make more students comfortable in your classes.

In some cultures students are discouraged from interrupting the instructor with a question, or even from calling out answers to questions posed to the class. Many of these same students are very serious, active participants in small group discussions and activities. I try to structure the class so there are legitimate ways for students from different cultures to participate. (Tepper School of Business)

American classrooms often favor students who speak up readily, while in many other countries all students are expected to learn mainly by listening. When it is important to get all of the students engaged actively, a mixture of large group interactions and small group activities can often accommodate the variety of cultural expectations and also address needs of U.S. students who may be reluctant to participate due to shyness or lack of confidence.

I try to interact with each student in a way that makes him or her comfortable. This requires some flexibility on my part, and a conscious attempt to gauge whether a student is assertive and quick to speak or quieter and more reflective. Especially to encourage participation from the quieter students, I need to enlist the more aggressive students to increase their wait time, too. As long as I let them know that I recognize the effort they have made and still value their input, getting cooperation has been easy so far. (Computer Science)

Increasing the involvement of quieter students can sometimes have an uncomfortable impact on the students who usually participate. For example, sometimes you will be asking male students to hold back a little longer before answering because you want women to join a discussion more easily. It is important to make your goals clear so that individual students understand that they are not being excluded or penalized and so that they understand why you feel inclusiveness is important to the entire class, not just one subgroup.

Checklist: Responding to Student Diversity

General Principles

- ✓ **Treat students as individuals whose identities are complex and unique.**
For example, you can ask open-ended questions to solicit students' reports of their experiences or observations without calling on a student to speak for his or her race/gender/culture. Also, learning to pronounce all of the names correctly shows respect for varied backgrounds.
- ✓ **Encourage full participation while being aware of differences that may influence students' responses.**
For example, you can make eye contact with everyone, increase your wait time to include less assertive and/or more reflective students, ask questions that draw out quieter participants or challenge dominant students in small groups, or talk with students outside of class to provide encouragement.
- ✓ **Vary your teaching methods to take advantage of different learning styles and to expand the repertoire of strategies tried by each student.**
For example, you can foster peer relationships with in-class collaboration, include concrete examples whenever possible, use visual or dramatic presentations, or value personal knowledge and experience when students share it.
- ✓ **Promote a respectful classroom climate with egalitarian norms and broad acceptance of differences.**
For example, you can encourage student projects involving diverse perspectives, discuss guidelines or "ground rules" for good participation, and monitor language use for implicit assumptions, exclusions, or overgeneralizations.
- ✓ **Be aware of possible student anxiety about their performance in a competitive environment such as Carnegie Mellon's but try not to "overprotect."**
All students – including those whose personal or cultural histories may include being a target of stereotypes and discrimination – need clear standards and evaluation criteria, straightforward comments on their work delivered with tact and empathy, and early feedback so that they can change their learning strategies or get help if needed.

Avoiding Common Problems

- ✓ **Avoid highly idiomatic English.**
Idioms are especially confusing for nonnative speakers of English or any student who may have been raised in another country or another region of the U.S. While the expressions may be colorful, many students may miss an important concept if the phrase is unfamiliar (e.g., "once in a blue moon," "between a rock and a hard place").
- ✓ **Provide some linguistic redundancy.**
Many students, particularly nonnative speakers of English, benefit from both seeing and hearing language (e.g., through the use of the blackboard or overhead projector) and from hearing key ideas stated in different ways.
- ✓ **Use diverse examples rather than ones that assume a particular background or experience.**
Examples that come easily are often those that come from our own experiences. Make sure you aren't consistently assuming all your students share that experience. For example, notice when many of your examples are based on cultural or regional knowledge, hobbies favored predominantly by one gender, or political or historical knowledge unfamiliar to those from other countries.
- ✓ **Don't assume that students who don't talk don't know the material.**
Being quiet in the classroom and not "showing off" are considered respectful in many Asian cultures. For some women and people of color, silence in the classroom may have been learned in response to negative experiences with participation (e.g., being interrupted by others, not getting credit for their ideas, having others talk to them in a condescending or dismissive way).
- ✓ **Watch the type of humor that occurs in your classes to be sure it denigrates no one.**
A surprisingly large number of jokes involve putting down people who are different in some way and who may already feel marginal because of those differences. For this reason, try to find humor in situations rather than in common stereotypes. For more about classroom humor, see pages 36-37.

Helping Students with Significant Difficulties

Students who are having personal problems and floundering because of it are hard to deal with, especially since most seem hesitant to talk to anybody about their problems. I often don't know what my role should be.

English, seven semesters of teaching experience

Students may feel unprepared for the complexity of some of their problems and look to you for support and guidance. They often view their TA as a valued contact person who can listen to their academic concerns and help them find further assistance or resources if they need them. When students feel alone, some may also confide in you about non-academic concerns. You may hear about a variety of sources of distress:

- poor academic performance
- time management problems
- illness or death of a loved one
- loss of an important relationship
- depression
- eating disorders
- feelings of loneliness or isolation

You don't have to be a trained counselor to be an important contact for students, and you shouldn't try to be an amateur one. Showing your concern for the student is, all by itself, helpful in many cases. When the student's difficulties are complex, the best role for a TA is making effective referrals to those who are more prepared to handle the subtleties of the situation. In this role you need not be the confidante or friend who listens regularly or for long hours, but just a concerned person who listens, asks questions and can find someone better equipped to follow through if there is a need. The checklist on page 32 can guide you through the process of supporting students who may need help and, when needed, making referrals to academic and non-academic resources.

If the situation is not too complex but is overwhelming for the student, some TAs are comfortable listening to the student's concerns and helping him or her identify the nature of the problem. You can listen quietly, ask questions about the options the student is considering, empathize when you have been through similar experiences, and offer some options that he or she can consider. Ideally, you can help students generate some options for themselves and you can simply point out some additional ideas and assist them in evaluating the advantages and disadvantages. Experienced TAs suggest the approaches below for reaching out to students in trouble and knowing your own limits in extending that help.

Send e-mail when they are doing poorly. When I did this, it motivated a couple of students to get help. Make it just an informative e-mail, not threatening or pushy. (Chemistry)

E-mail is a great way to reach out to students, especially those who may be missing class. Unfortunately, e-mail is also easy to ignore. If you are worried about the student failing the class, you may want to take advantage of opportunities to talk face-to-face too so that he or she doesn't misinterpret your intentions as additional pressure.

For students who are doing really poorly, I've tried to turn it around and relate my experiences that maybe weren't so successful. I never tell them that they aren't cut out for their major. (Physics)

While you may not always feel like an authority figure, students will surely see you that way if you are having a conversation about their abilities or potential. If you share any negative assessment of the student's abilities, they may take it very seriously in deciding their own educational and career path. It is best to keep your comments focused on specific observations about assignments or discussion of the students' various interests.

It helps when the student is emotional to know that the problem may not be in just your course. For example, according to the H&SS Advisory Center, students who are having trouble in World History are often having trouble in other courses. (History)

Be sure to find out the procedures for academic advising in your college so that you know whom to contact about students who are having significant academic difficulties. Procedures vary across colleges and sometimes with the student's year in school, so you need to ask a faculty member or experienced TA to get the details relevant to your teaching assignment. If you teach a course in which many students have difficulty, be sure you know how to report on any students who are in trouble so that their advisors can also assist them.

Checklist: Supporting Students Who May Need Help

- ✓ **Has the student sought you out either simply to listen to his or her difficulties or to ask for specific advice or assistance?**

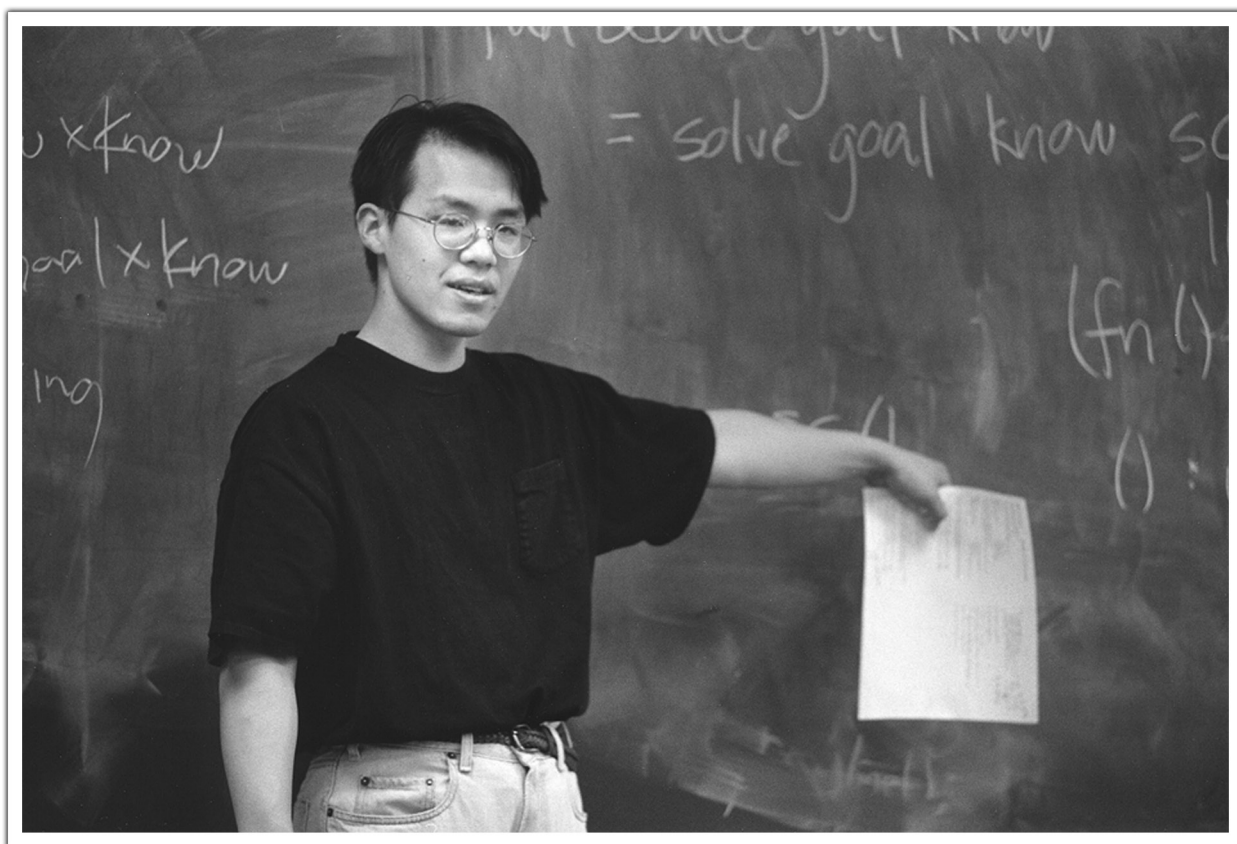
If so, the student probably trusts you to assist in the next steps if further help is needed. The next steps may not be clear or immediate, so you may simply want to be available to the student for general support for a while. Students often benefit from your ability to listen carefully and to empathize with their situation. If you can't empathize based on your own experience, it is often enough to listen attentively and show your concern.
- ✓ **Do you know if the student already has other people to support and advise them about their concerns?**

Ask the student whom he or she feels comfortable talking with. Sometimes there isn't anyone, so you may need to decide how much you can or should do. One option is to help them to better identify the nature of the problem and, if needed, the kind of help they might consider.
- ✓ **Do the student's behaviors seem to be out of sync with previously expressed goals?**

If so, you might talk with the student about this observation. He or she may not be aware of the inconsistency. For example, he or she may talk about pursuing graduate study in your field but not be devoting very much time to your course.
- ✓ **Are you concerned about a student in terms of his or her academic performance or personal welfare?**

If so, talk with the professor about your concerns and the problems you have noticed. He or she will often want to talk with the student. If a student gives you personal information in confidence, be sure to honor that confidence. The only exception is if a student confides in you about something that seriously threatens his or her life or someone else's. In that case, contact Counseling and Psychological Services immediately.
- ✓ **Might the student need further assistance or guidance beyond what you are able to provide by supportive listening alone?**

At this point, you or the professor should consider finding someone who can assist the student more effectively. Information about resources for students is provided on pages 138-140. Describing multiple options that may be of use gives students under stress an important sense of control. If it isn't clear where to begin, you might suggest a first point of contact to help the student further. The Dean of Student Affairs Office can provide a college liaison to assist the student with many kinds of personal or financial concerns. The associate dean in his or her college can assist with many academic difficulties. Note that the lines between personal and academic difficulties are not always clear and that either type of support can be effective if the student is comfortable contacting this person.



Being New to Teaching in the U.S.

Students at Carnegie Mellon come from many different cultures and countries; this diversity is part of what makes the university so exciting and innovative. At the same time there are many challenges created when TAs and students do not share the same linguistic and cultural background. Many international and nonnative English-speaking students are surprised by the difficulties they face as TAs at Carnegie Mellon regarding the differences in classroom culture and language use. Even if you are comfortable and experienced communicating in academic English, the culture of the U.S. classroom may require some adjustments for you to be able to communicate your knowledge effectively to U.S. students.

Many international and nonnative English-speaking students are surprised by the difficulties they face as TAs at Carnegie Mellon regarding the differences in classroom culture and language use.

Language Strategies for Nonnative English Speakers

Language is number one. When you are talking to students, you'll need to be very careful – speaking slowly, clearly.

Mathematical Sciences, four semesters as a TA

The checklist on page 40 summarizes the support available to nonnative English speakers.

Teaching is linguistically demanding: to be successful as a TA you need to be able to put your knowledge in clear and simple English, understand and respond to the questions students ask, and be familiar with the expectations for teachers in the U.S. (often different than in many other countries). Many international and nonnative English-speaking TAs have found the support offered by the Intercultural Communication Center (ICC) helped them develop the language skills and understanding of classroom culture to succeed as TAs. The ICC offers a wide variety of support services to enable you to improve your communication. The checklist on page 40 summarizes the support available to nonnative English speakers.

Carnegie Mellon policy and Pennsylvania law require TAs who are nonnative English speakers (that is, whose first language or mother tongue is something other than English) to take a test of language skills before they can be certified to work as TAs. (Note: “International Teaching Assistant” (ITA) is the term recognized nationally, but includes all nonnative English speakers even if they have green cards or U.S. citizenship.)

The following anecdotes from experienced ITAs may help you understand some of the difficulties that may arise due to language differences.

Whenever I meet a class I will tell them, “English is not my first language, so you may get lost sometimes. When I get comfortable, I talk too fast.” I tell them, “Don’t hesitate to stop me.” I think it is important to be friendly, too. (Mathematical Sciences)

The ICC recommends that ITAs “break the ice” with students by directly addressing language differences on the first day of class. For example, the ITA might say, “English is not my first language (or I speak a different variety of English), so we may sometimes misunderstand each other. If you need me to repeat or reword, just let me know and I’ll do the same with you.” Students will not lose respect for you; rather, they will see you as confident, professional, and concerned about the clarity of communication in the classroom.

When you can’t think of the right word, you can ask one of the students. They are happy to help and it builds your vocabulary. (Robotics)

When I talk fast, I have a hard time pronouncing some words, like “sole proprietorship.” So I will point to the word on the board while trying to pronounce it. Students understand what is going on and they like it. I sometimes tell them what I want to say without using the word I can’t pronounce. But you can’t do this too often. If you do, it means your English is not good enough. (Tepper School of Business)

Many graduate students who are nonnative English speakers have few opportunities to develop “teaching fluency” because most interactions are

with faculty or peers who share the same context and knowledge base. A much higher level of fluency is required to communicate to “learners.” One good way to develop your teaching fluency is to practice explaining your discipline to people outside of your field and then to get feedback about the clarity of your language. The ICC provides many venues for you to develop the necessary teaching fluency (see page 40 for more details on ICC services).



Adjusting to U.S. Students' Expectations

I didn't know what to expect culturally. I didn't know what American students were all about.

Physics, three semesters as a TA

When they begin work as TAs, international students face many potential differences in teaching style and expectations for student/teacher interaction. These potential differences can include: level of formality, amount and type of questions students ask, degree to which the instructor is responsible for clarifying technical concepts and illustrating them with concrete examples, and using appropriate methods to discipline students and manage classroom interactions. Below are some strategies from experienced TAs who have successfully made the transition to teaching in the U.S.

Approachability

You have to give them the impression that you are friendly. If they are afraid of you, they won't approach you. You do not want to make students afraid of you. If you are afraid of them as well, that can give them the wrong impression. First impressions are very important.

(Tepper School of Business, originally from China)

In some countries instructors are more formal, move about less while teaching, and seldom chat with students in the classroom. In the U.S. this teaching style can be misinterpreted as indicating that the TA is unapproachable or uninterested in the students. Some of the ways in which U.S. instructors connect to their students is by making small talk with the students before and after class, moving comfortably around the room, and using students' names. Research shows that when nonnative English-speaking TAs use these strategies, the students are more receptive to them and more willing to overlook gaps in language. For some tips on learning student names, see page 17.

Back home I can call on a student who is not paying attention. Doing so will signal that I am upset. Here I have to worry about not embarrassing the student. (Tepper School of Business, originally from Mexico)

Many instructors in the U.S. feel that calling on students who are not paying attention is a gentle way to refocus their attention. However, there are cultural differences about the manner, tone of voice, and words used to ask this question. If you use the technique, it needs to be done in a way that does not embarrass the student. It is important to use a neutral tone of voice and to say something like, "Susan, what is your opinion?" or "Do you agree with John's argument?"

It's difficult being friendly here sometimes. It's difficult to make a joke. I don't get students' jokes. If I tell an Italian joke, they won't get it.

(Statistics)

The best thing to do is to tell a joke about yourself. Good topics for jokes are me, math, and mathematicians.

(Mathematical Sciences, originally from Russia)

Using humor in the classroom helps to create a connection between the TA and the students, resulting in a classroom that is more open to discussion and student participation. However, using humor does not mean that TAs need to tell “jokes”; in fact, because jokes are so culturally loaded (and potentially insulting), telling a joke can easily backfire for an international TA. Laughter can come from many classroom situations in a spontaneous way.

Examples

They want examples, but things that come naturally to me don't make sense to them. Everything is about baseball here.

(Statistics, originally from Italy)

Using concrete examples is a central part of teaching in the U.S. Students here expect to be able to relate theories or principles to real situations and are not as comfortable with abstract theory as you may expect from experiences in your home country. Examples from familiar contexts are often useful in introducing complex concepts because students can relate to the ideas and ask questions more easily. You may want to talk with your colleagues about the kinds of examples they find useful.

Showing respect

In Mexico, students are expected to pay attention to the instructor. Here it seems like I have to jump up and down to get their attention. Students can get away with falling asleep in class! In Mexico, a student would never do that – it would be disrespectful. (Tepper School of Business)

Instructors in the U.S. do, to a noticeable extent, have to work to earn students' attention. You don't have to be an entertainer, though. Relatively simple steps such as having a routine for beginning class (e.g., writing the agenda on the board and closing the door), maintaining good eye contact, and moving around the room make a big difference. If you can also choose examples that are interesting to students, you are more likely to get their attention. The more you develop your command of teaching techniques, the more you will be respected as teacher.

Once, in Venezuela, there were two students talking in my class. I took that as an disrespectful gesture toward the instructor. At that moment, I looked at the students and said to them, “If you have a comment about what we are talking about in the class, feel free to share it with the rest of the people in the classroom.” They stopped talking, and the rest of the students understood the message: I did not like background talking, but questions or comments were welcome. When I reacted that way in the same situation in my class this semester, the two students were really shocked and the message was not understood. I feel that if I react more drastically I will be perceived as if I am not respecting them. (Tepper School of Business)

This strategy of dealing with background talking can also work well in the U.S. with a slight adaptation. You can ask sincerely, “Do you have a question?” and students will often understand that as discouraging their unrelated conversation without being too harsh. However, if the problem continues, you may also need to speak with the student(s) after class to explain that their background talking is distracting and problematic for others in the class. This way you can make your point and also avoid embarrassing students in front of their peers, whose opinion may be more important to them than the instructor’s. More detail about strategies is provided on page 44 under “When students disrupt class.”

Don’t be late. In India people will wait, but here you can’t be late.
(Mathematical Sciences)

In fact, most TAs and instructors in the U.S. come to class 5-10 minutes early. Being available a few minutes before class gives you a chance to get to know students informally and also to answer some questions in a friendly and efficient way.

In India, the professor is God. The classroom is very formal. One thing that was hard for me was getting used to the concept of students eating and drinking in the classroom, which in India would be considered an insult. I kept thinking, how can they do this? Now I don’t care. It’s no big deal. (Mathematical Sciences)

The U.S. classroom is much less formal than in many other countries. Other behaviors that may have been considered disrespectful in your culture but are often accepted in the U.S. include students putting their feet on the furniture, leaving books on the floor, or calling instructors by their first names.

Avoiding offenses and misunderstandings

You can’t stand or sit too close to someone because people may think you mean something else. Also, some things may seem sexist. I got in the habit of saying “he or she” instead of just “he.” You have to worry about not offending anyone. I think, “Am I saying something that someone will sue me for?” (Mathematical Sciences, originally from India)

Appropriate distance varies from culture to culture. Depending on what country you come from you may feel that people in the U.S. stand or sit either too close or too far away. In the U.S. you will notice that the norm is to stand about three feet (one meter) apart. Closer proximity is usually reserved for family and close friends. Also, keep in mind that teachers do not generally touch students at all because intentions can be very easily misunderstood.

Keep the door open during office hours. In these sexual harassment days, you have to be careful. (Statistics, originally from Italy)

The hierarchical relationship between a TA and student is very complex to maintain when part of your goal is to be approachable and friendly. When the potential for miscommunication due to cultural differences is added to this complexity, it is wise not to take chances that increase the likelihood of miscommunication about intentions. An open door is one simple way to keep students feeling comfortable. You can learn more about these issues by taking the on-line training course for sexual harassment awareness (at <http://training.newmedialearning.com/psh/carnegiemellon/>). For more about policy information, see page 137.

Assigning and reporting grades

In Russia, a student could get a mark [comment] like “you are stupid.” If I wrote something like this here, I would get fired.

(Mathematical Sciences)

There are many cultural differences about the type of language that is considered appropriate to use with students. TAs from some cultures find the U.S. discourse style to be too direct while others (like the student above) feel that the U.S. style requires them to communicate in a more indirect way. See pages 100-104 for more guidelines.

The general idea here seems to be just to give everyone more marks [points]. In India, it was hard to get a sixty out of a hundred. Here if you get 80 out of 100, you are failing. (Mathematical Sciences)

Grading practices can vary substantially among different courses and among different departments, particularly with respect to whether or how partial credit is awarded. Be sure you talk with faculty members and other TAs so that you can adjust your standards, if needed, to fit the norms set by your colleagues and maintain consistency within your course.

The first time I graded I was going to hand out the spreadsheet with everyone’s grades. I had only good intentions. I asked someone if I should make copies for everyone or just have one that all students could see. The response was “What!?” I didn’t know that I’m not supposed to tell students their grades this way.

(Mathematical Sciences, originally from Russia)

In the U.S. students’ grades are private and it is illegal to post them publicly. Be cautious about passing out students’ papers with the grades written where other students can see them. See page 136 for more on students’ rights to privacy.

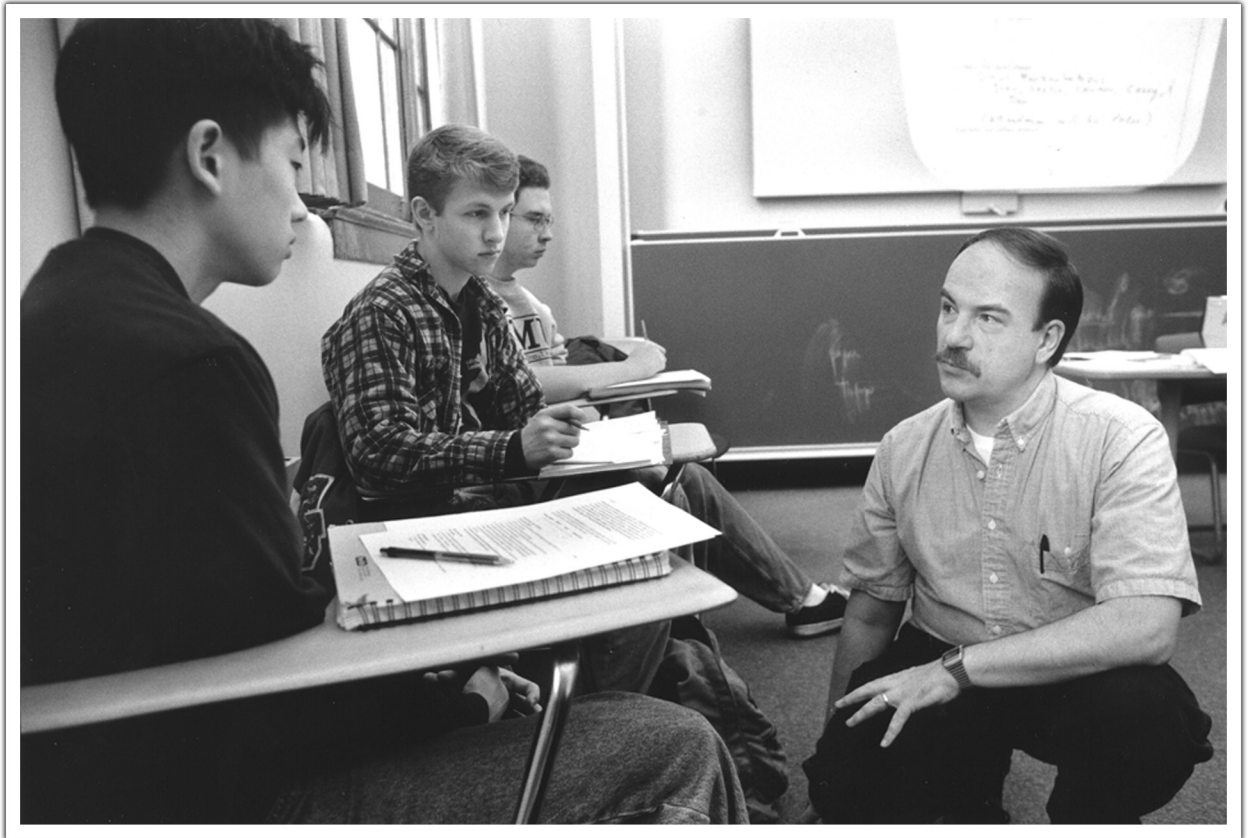
Checklist: Support for Nonnative English Speakers

Offered by the Intercultural Communication Center (ICC)

- ✓ **Placement interviews.**
During the interview an instructor from the ICC meets with students who are nonnative English speakers to evaluate their language abilities in order to place students in the appropriate ICC services, and to suggest the most realistic date to take the ITA test (if applicable).
- ✓ **International TA (ITA) testing.**
Carnegie Mellon Policy and Pennsylvania law require TAs who are nonnative English speakers (that is, whose first language or mother tongue is something other than English) to take a test of language skills before they can be certified to work as TAs. (Note: “International Teaching Assistant” (ITA) is the term recognized nationally, but includes all nonnative English speakers even if they have green cards or U.S. citizenship.) The ITA test is a teaching simulation in front of a jury of raters; it is a rigorous test given that the level of fluency needed to teach undergraduates is much higher than that needed to be a student or to give prepared talks.
- ✓ **Classes, seminars, and workshops to develop academic language skills.**
In addition to a credit class, “Language and Culture for Teaching” (99-452), that deals with both culturally appropriate teaching and advanced language skills, the ICC offers more than 25 workshops and seminars designed to help students develop the various aspects of academic English. These include such topics as “Focus on Pronunciation”, “Presentation Basics”, and “Advanced Fluency Challenges”.
- ✓ **Individual tutoring.**
One-on-one appointments allow each student to focus on whatever skill would be most useful in helping that student develop academic fluency. These skills may include pronunciation, grammar usage, general fluency, listening comprehension, and cultural understanding.
- ✓ **Self-paced language work.**
Using multimedia materials available at ICC, students can work on pronunciation, field-specific fluency, teaching skills, and listening comprehension.
- ✓ **Writing clinic.**
This one-on-one support service is designed to help students improve the writing skills needed to succeed in their academic work.

For more information on all of the ICC services, visit www.cmu.edu/icc.

Contact information for the Intercultural Communication Center (ICC) is provided on page 140.



Strategies for Difficult Situations

You will soon realize that you know more than you thought.

Mechanical Engineering, five semesters as a TA

When you are new and need more confidence

I prepared more, a little extra. Once you get to know the students and get through the unknown, I think the confidence issue decreases. Even now, I'm nervous until after about the first five meetings.

(Physics, seven semesters as a TA)

You can accelerate the process of learning about students by collecting some information about them in the first class. Some questions you can ask are provided in the checklist on page 26.

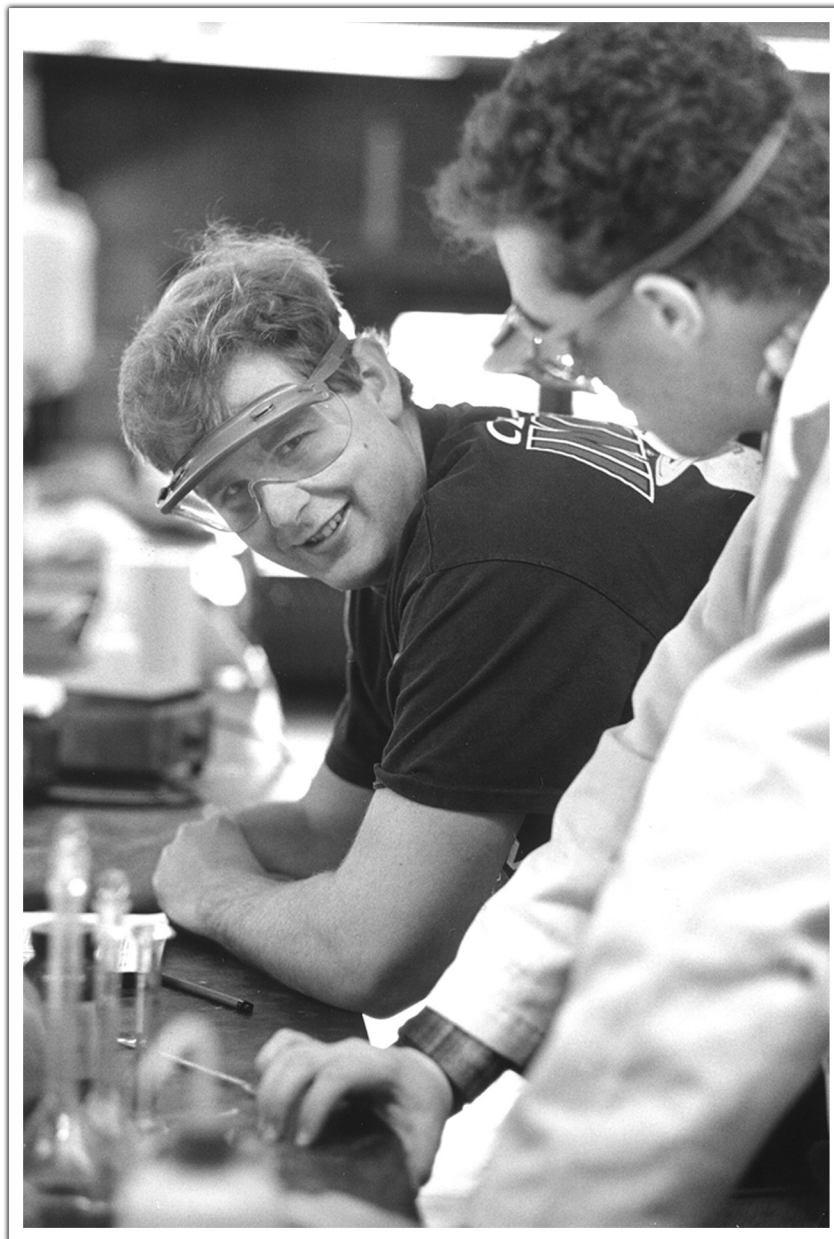
My concern at the beginning was whether I knew enough. To be sure that I do, I work out all the problems on my own.

(Mechanical Engineering, a grader)

In future courses, you'll be able to use these solutions to increase your efficiency. The time they take is well invested to build your confidence and explanatory skills now and to save you time later.

In this section, we provide strategies from TAs for TAs for situations:

- When you are new and need more confidence
- When you are about the same age as your students
- When you don't know an answer
- When students disrupt class
- When friends are in your class



When you are about the same age as your students

I'd taken Calculus I and II but still didn't know if I knew enough, if I was TA caliber. I was only one year older than them. I found that it didn't really matter. In fact, I didn't even mention it and it didn't become an issue. Most thought I was a graduate student and when they found out I was only a sophomore, it didn't really matter.

(Mathematical Sciences, undergraduate TA)

When you are similar in age and experience to your students, your first priority is to demonstrate your competence as a teacher by being prepared and organized for every class. If you are able to grasp their questions and respond to them effectively, students won't be concerned that you may seem young. In some cases, your knowledge of the course based on taking it yourself may give you greater insights into the nature of students' difficulties.

Most of the people in the class were the same age as I was so I wondered whether I was going to have their respect. (Physics)

TAs in this situation can compensate by being particularly conscious of professionalism and finding ways of establishing authority. You might want to be especially conscious of dressing nicely and of maintaining a little more formality than other TAs.

When you don't know an answer

I used to spend a lot of time trying to answer the question right on the spot, thinking that if I talked enough, maybe it would come to me. I wound up just confusing everyone. Now I'm confident enough to realize that it might be a subtle question and I'll need to think about it a little. (Physics)

Keep in mind that, by pausing to think, you are also showing students that it is okay for them to stop and think before answering. Saying, "I don't know, but let's see if we can figure it out together" or "I don't know, but I'll find out and get back to you" are also appropriate responses in many situations.

People make mistakes. How students perceive the error depends largely on how you react. If you simply correct the error quickly and calmly, they will hardly even notice. On the other hand, if you let yourself get flustered, then suddenly the error begins to seem much worse than it actually is – to everyone involved. (Computer Science)

Some TAs say they find they can keep their perspective on small mistakes by reminding themselves how much more background and experience they have than the students. Also, if your mistake is similar to the kind that students may make, you might take the time to talk about how it happened and how they can avoid the same problem.

The one thing that I remember from TA training was that it is OK to make mistakes. No one expects you to be perfect; just do the best job you can. Don't try to snow them or impress them – just do your job. (Physics)

As long as you are preparing and doing your best to convey the material to them, students will work with you through a few mistakes.

When students disrupt class

I try to stop the distractions without making the student uncomfortable. You have to be smiling. (Physics)

It helps not to take small classroom disruptions too seriously. Instead of reprimanding someone, it is often sufficient to make them aware that their talking (or other distracting behavior) isn't appropriate at that time by making eye contact with them or standing near them for a few seconds until they stop. Humor or a smile can deflect problems in the making if you take care not to embarrass students.

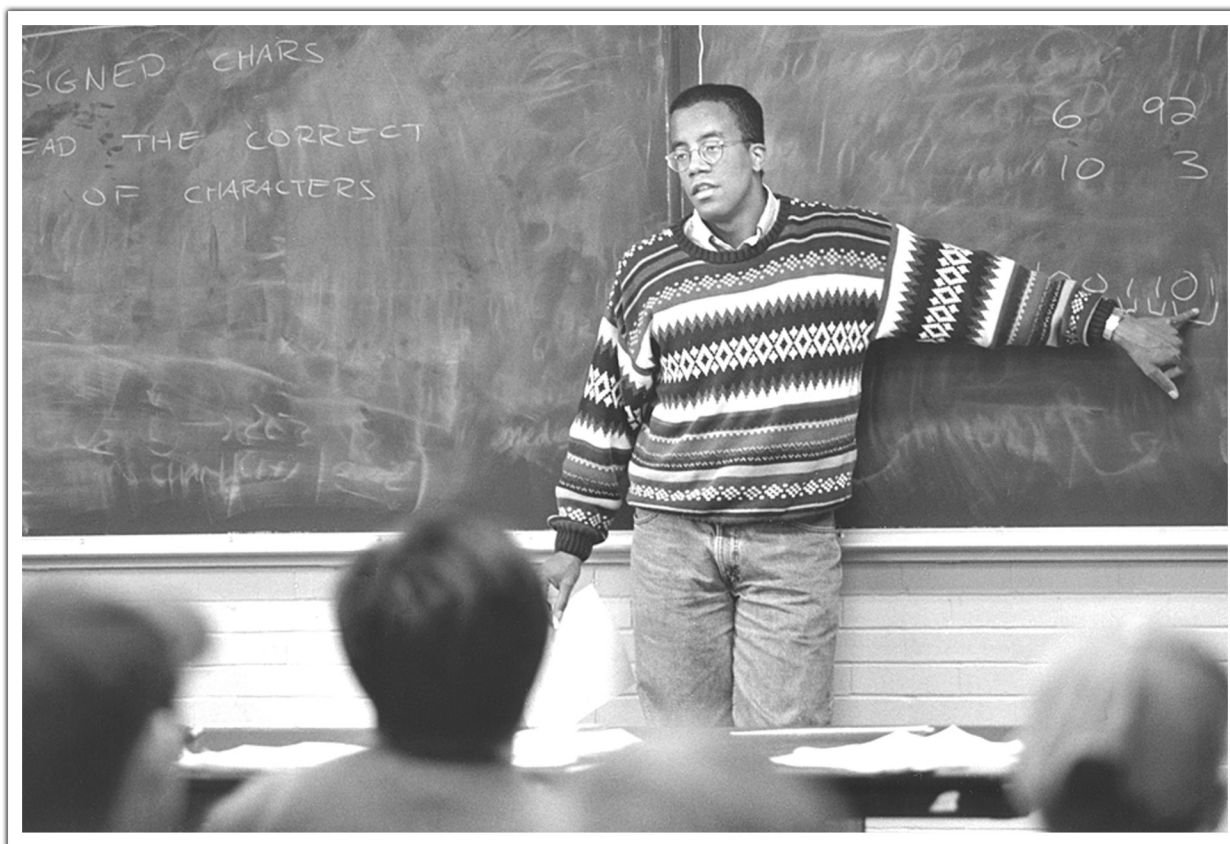
What do you do about people in the back who don't pay attention? Invariably, there is a correlation between those students and the ones not doing well in the class. (Physics)

If students are talking or doing something else that interferes with other students' learning, you need to let them know right away about the problem but in a way that doesn't embarrass them or make you appear out of control. The first step is often to talk with the disruptive students individually before or after class to let them know there is a problem. If the problem continues, you need to say something in class so that other students know you are not ignoring the problem. For example, "I've noticed that the level of background noise in class is making it hard for me and others to hear. Please feel free to ask me if you have questions about the material, but otherwise I'd appreciate it if we could keep the classroom quieter so that everyone can concentrate."

When friends are in your class

I'm a TA for courses for which my friends have registered. Sometimes I grade their assignments and, a few hours later, I'll meet them in a bar. There is a mutual agreement that we do not discuss it. (Civil and Environmental Engineering)

Being a grader in this situation tests your ability to be both a friend and an authority. Any time you need to address questions about grading with a friend, you need to be exceptionally clear about the grading criteria and to maintain a professional demeanor. It may help to discuss grading issues only in academic settings like office hours or the classroom.



Clearer Presentations and Explanations

Many TA positions require you to present and explain information in various settings (e.g., recitations, discussion sections, review sessions, brief pre-lab lectures), so it is helpful to focus on some of the possible goals of these presentations.

For many people, the prototypical image of college-level teaching is the instructor or TA presenting material at the front of the classroom. Many TA positions require you to present and explain information in various settings (e.g., recitations, discussion sections, review sessions, brief pre-lab lectures), so it is helpful to focus on some of the possible goals of these presentations, such as to:

- reinforce and emphasize main points addressed in lecture or in the reading
- review and clarify difficult material with new or more detailed examples
- explain new methods of analysis or problem-solving
- address misunderstandings identified through students' performance on assignments or quizzes

The TA's goals complement the lecturer's goals by taking advantage of having a smaller group of students where it is easier to identify and respond to students' difficulties. In this setting, TAs can obtain feedback about how many students truly understand the material for two reasons.

First, students are generally more willing to ask their questions in front of a smaller group. Second, TAs can take more time than lecturers to ask questions in order to find out what students already know. Thus, the key activities for most TA presentations are presenting some information and checking to make sure that students understand it. You may want to review the checklist of key goals on page 14 before reading the following sections on strategies for using visual aids to hold students' attention, selecting examples, deciding how to balance coverage and interaction, and adjusting your pace to varied student levels.

Focusing Students' Attention

It is one thing to understand the topic and another to get it across.

Heinz School, four semesters as a TA

In each class meeting, students try to concentrate in the midst of much competition for their attention: their previous courses, the graded exams or papers they just got back, difficult assignments that are due soon, and all of the social distractions of college life. In addition, when the course material is completely new to them, students may have trouble identifying which of the many pieces of information are more important than others. They may perceive class as a stream of small, somewhat related facts and not readily see the larger patterns or "chunks" that are most important. They may comprehend separate claims but not how they fit into an overall argument or theory.

Instructors and TAs can use a combination of verbal and vocal cues, body language, and visual aids to highlight the structure of the ideas so that students' attention is focused appropriately. Varying the activities every 10-15 minutes during class also helps students to re-focus if needed. Effective visual aids, in particular, can help students to see relationships between ideas more clearly and to monitor their own understanding. Experienced TAs offered the following advice on holding students' attention.

Good professors and teachers use regular, spoken English, not jargon-laden speech. (Statistics)

Graduate students are usually immersed in the terminology of their disciplines. This fluency with technical terms is a great advantage in teaching advanced courses, but it can intimidate and overwhelm students in introductory courses. It can also increase the distance students perceive between you and them. Periodically paraphrasing technical terms in layperson's terms can clarify their meaning, especially when the term is relatively new to students. Also, a conversational tone of voice with a high proportion of plain language and natural variations in rate and pitch

You may want to review the checklist of key goals on page 14 before reading the following sections on strategies for using visual aids to hold students' attention, selecting examples, deciding how to balance coverage and interaction, and adjusting your pace to varied student levels.

can help students to listen more easily and effectively. Other suggestions about effective speech are included in the checklist on page 50.

I had a Teaching Fellow videotape me and make recommendations about my use of the blackboard. He suggested that I emphasize key words because they help students and they help me see what I've covered. It also helps limit what students write down. After three semesters, I can do this spontaneously. But for the first two semesters I taught this course, I always planned in advance. (History)

A well-organized board can reinforce the conceptual structure of the material by having clear sections with meaningful headings. Try not to use the board as a public "scratch pad" or informal workspace; instead plan exactly what you want students to see. More advice on board use is provided in the checklist on page 50. For more about working with a Teaching Fellow to get feedback on your teaching, see the checklist on pages 128-129.

At the beginning of each class, on one side of the board I write a summary of the main principles and results that we are going to use in solving problems. I call them "Anchor Points." The students find these Anchor Points to be very effective and useful in learning the material and for doing the problems. To conduct an effective recitation with these Anchor Points, it is also very important that the other side of the board is used to solve carefully chosen problems that illustrate these principles and results. (Physics, faculty member)

Anchor Points in physics or other scientific or technical courses can include several key principles and conditions for applying them. Having these materials provides a regular review of the most important concepts and also offers prompts to help students solve and discuss problems in each class.

In Statistics, we have lots of formulas. Students complain when we use the board because it's often not clear where the formula begins or ends. Students find using a document camera more effective. (Statistics)

Document cameras are available in many classrooms on campus (see www.cmu.edu/computing/mediatech/support_classrooms.html to view the list of equipment available in your classroom). The advantages of this technology include the ability to prepare visual aids carefully in advance when needed, to maintain greater eye contact with students than when facing the board, and to share copies of your notes with students easily. A potential disadvantage is that using prepared pages may lead you to present the material too quickly. If you are uncertain about what type of visual aids meet your needs, please feel free to contact the Eberly Center to discuss your options.

Bring in or create periodic one-page handouts to illustrate particular points, supplement existing reading and remind students that if they miss class, they may miss unexpected information or discussion topics.

(English, faculty member)

Especially in classes where diverse points of view are essential to promoting discussion and detailed analysis, handouts can provide the impetus for questions about how the context of a reading influences its interpretation or how a particular example is or isn't consistent with theories or principles presented earlier.

Use some kind of demonstration, like a working circuit.

Something visually interesting works as a good motivator.

(Electrical and Computer Engineering)

Be sure to test your demonstration in advance with the same conditions that will be available in the classroom or lab. If it is difficult for the entire class to see, use a data projector or consider whether you can repeat the demonstration for 2-3 smaller groups.

Show the occasional relevant film clip, even just 10 minutes, from a documentary or other film from Hunt Library's Video Collection Office in order to break up the routine of class discussion, to give a feel or background information for a historical period, or to provide another viewpoint on an issue under discussion. (English, faculty member)

Selecting and discussing brief video excerpts is often preferable to using large segments because students stay more actively engaged and can more easily recall the details of what they saw during discussion. In addition to the videos held in the Instructional Technology collection, many departments also maintain collections of videos relevant to issues in that discipline. Also, you might find useful films at Carnegie Library in Oakland. For how to reserve videotapes at Hunt Library, see pages 135-136.

The Clicker

A technology that is available in most large classes now is the clicker. The clicker, or Classroom Response System (CRS), is an interactive technology that enables instructors to pose questions and immediately collect responses from the entire class. The system automatically tallies the responses and instantaneously projects the results in a graphical format for the entire class to see. The clicker provides immediate feedback from and to students, allowing the instructor to quickly adapt the lecture to respond to students' needs. The clicker can also be used to track attendance and for quizzes. For more information, contact the Office of Technology for Education at 412-268-9090 or see www.cmu.edu/teaching/.

Checklist: Environment, Speech, and Board Use

Classroom Techniques from Dr. Hugh Young

Speech

- ✓ Look directly at students when you talk (and not always the same ones). You can avoid talking to the board or screen by turning around frequently, such as after writing 1-2 lines.
- ✓ Speak loudly enough, but not too loudly. Encourage students to signal you if they can't hear you or other students. You may need to repeat what students say.
- ✓ Speak a little more slowly than you think you need to, especially if English is not your first language. Slowing your speech will often help you to enunciate more clearly.
- ✓ Don't do anything to distract attention from what you're saying. Avoid mannerisms such as "you know," "like," and so on.
- ✓ Feel free to stop and think. Using "uh-h-h" or "ah-h-h" to fill up silences can make you appear nervous and unprepared.
- ✓ Use gestures to emphasize important points. Standing near the board or screen and pointing to a key idea is one way of reinforcing it. For material that requires visualization in three dimensions, gestures are especially useful.
- ✓ Don't read long passages out of the text. If students need copies of problems to be discussed, ask them to bring their texts to class or provide handouts. For many passages, you can give references and let students read for themselves.

Environment

- ✓ Check the temperature of the room; eliminate drafts or control the heat if possible.
- ✓ Turn on the lights and regulate shades to control blackboard glare. Check the timer, if there is one, so the lights don't go out after five minutes.
- ✓ Close the door to shut out hall noise and distractions. This can also serve as a signal that you are ready to start class.
- ✓ Evaluate the seating arrangement: Can all students see and hear? If the room is uncomfortably large or small for your class size, see strategies on page 76.

Use of the board and/or document camera

- ✓ Erase the board completely before starting class.
- ✓ Use board area systematically; usually work from left to right. Plan ahead if something has to be kept visible all period. Planning is especially important if your classroom has multi-layer boards.
- ✓ Write legibly, even if it takes longer. If you can't write legibly, print. Learn to write in straight horizontal lines. It can help to practice in an empty classroom.
- ✓ Write large enough for students in the back of the room to read it easily. If you are in a large lecture hall, buy extra wide chalk to ensure visibility.
- ✓ Stand aside so that students can see what you have written. If you move around the room rather than always standing near the center of the board, it helps you to make eye contact with a variety of students.
- ✓ Give students time to keep up with what you're writing. Watch them for clues as to whether you're going too fast. Don't erase to do algebra or manipulate equations.
- ✓ Use consistent symbols and be sure your notation is consistent with the text. For more about maintaining consistency with lecture, see "Clarifying Faculty Expectations" on pages 7-9.
- ✓ Draw diagrams carefully; use a ruler if necessary. Be sure to label the axes on all graphs.
- ✓ Use colored chalk/markers for diagrams, especially for vectors and for emphasis in equations.
- ✓ Learn how to deal with the problem of squeaky chalk. Use the edges rather than the point and avoid holding chalk the same way you would hold a pen or pencil.

Selecting Examples

Among the most important decisions instructors and TAs make are the types of examples they will use. Why do examples matter so much? Examples can:

- help students relate abstract ideas to concrete situations
- show students the range of contexts over which procedures or concepts can be applied and how application details vary in different situations
- demonstrate that new theory is needed
- provide a way to illustrate how complex methods of analysis are used
- prompt students to ask questions at a fine level of detail
- enable students to see how course material is related to their personal or professional interests
- add variety and humor

Selecting effective examples can take considerable time, especially when you want to accomplish more than one goal with a single example. The kinds of examples you choose should typically cover a range of difficulty, including examples similar in complexity to those that may appear in exams or paper assignments. Examples for introductory courses can be found in supplemental textbooks or student guides. For many courses, examples can be gleaned from the news or professional periodicals. Experienced TAs offer the following suggestions about examples.

Giving real applications really jazzes up the students.

(Mathematical Sciences)

Students in mathematics courses particularly appreciate examples that show physical applications of the course concepts.

People pay more attention when there is a story. One of my professors was talking about fracture mechanics. He talked about how long a crack in the body of an airplane can be before it threatens the safety of the plane. The students were riveted. (Mechanical Engineering)

Stories help in part because they enable students to see a situation from the perspective of an interested party. Depending on your course, you might choose the perspective of a participant in a study, a researcher or professional in the field, or a stakeholder in some policy matter.

In engineering, things tend to get abstract. It is helpful for the students if you give concrete examples and context when you can. It is possible to take a whole course and still not know how to use the material to solve a real life problem. (Mechanical Engineering)

Give them something to relate to. Entropy is really important but intangible. Explain it as disorder in their room. Bring it down to something that they can relate to in their life. (Chemical Engineering)

It can be difficult to find just the right comparison that is both familiar and accurate because familiar examples often don't capture the complexity of the concept. Be sure to let them know if the comparison leaves out important features.

Using small examples is helpful, especially for showing students that doing history is about interpretation. (History)

In discussion-oriented classes, you may need many, many small examples in order to help students see beyond any one context to the larger pattern you want to address. You can use comparisons across examples to enhance the level of interpretation and analysis.

It seems I'm always trying to draw the students out, to get them to see beyond the specific example. (English)

Especially for beginning students, the general concept or procedure is deeply intertwined with the details of the example used to introduce it. Naturally, the number of examples you can discuss in class is limited, but even quick multiple examples assist students in seeing the large patterns and principles.

Approaches to Coverage

I believe it is a fallacy to think that if you say it, you have taught it.

Computer Science, two semesters as a TA

The central issue is how to balance presenting information to students and asking them to use it so that you can respond to any difficulties they may have.

If your role as a TA includes presenting new material or reviewing lectures, you need to develop strategies to cover the material in the time you have so that students learn effectively. However, "coverage" isn't very useful if students don't understand the ideas well enough to apply them. The central issue is how to balance presenting information to students and asking them to use it so that you can respond to any difficulties they may have. Sometimes the professor will give you a clear agenda and priorities. At other times, it will be your responsibility to be familiar enough with the content to set priorities and decide wisely what to emphasize or clarify for students. Each of the strategies below has a valid rationale, but you need to identify which approaches fit the demands of your particular course.

I try to do lots of different kinds of problems so that we can touch on every topic. (Chemistry)

This approach enables you to review everything relatively uniformly. It is most effective when each problem can be solved interactively in a

couple of minutes and when the professor hasn't given you specific guidelines about what is most important. Take care not to rush through so many problems that students lose the opportunity to ask and answer questions.

I try to take a few sample problems that will cover a broad spectrum of topics. (Physics)

Problems that involve applying multiple concepts or principles are often similar in difficulty to the ones on the exams, so they provide valuable practice. However, since they may be very difficult for some students, you need to monitor class participation carefully and ensure that the level of difficulty varies so that all students benefit from most of the explanations.

Depending on the type of class and how much freedom I have, I don't try to do lots of problems. I do a few slowly with a lot of detail. I make students solve problems. I don't worry about covering everything. The purpose of the recitation is basically to enrich problem-solving skills. I act as the recorder and ask students, "OK, what is the next step?" (Physics)

When you focus on problem-solving skills, you need to pay great attention to students' reasoning as well as their answers to your questions. Why do they suggest a certain step next? What inferences can they draw from the answers they get? When their responses are incomplete or incorrect, it is also important to probe what went wrong to help them understand similar situations in the future.

Before every class, pick only 3-5 things that you want your students to leave the room remembering. If you cover any more than that, important information may get lost. Having that list of key points makes it easy to make sure that you cover all of the crucial topics if you find yourself running out of time. (Social and Decision Sciences)

If you are clear about your priorities, students are usually better able to identify and focus on what is most important. Without setting priorities in advance, you may not use the limited class time as wisely as possible and students may not focus on the bigger picture as much as you'd like.

Appropriate Pace and Level

You need to think about the background of the students you're teaching. How can various knowledge levels be addressed? Do you teach to the middle?

Psychology, two semesters as a TA

Because almost every class includes students with a wide array of skills, it can be challenging to pace your delivery and know how to adapt

your explanations to your audience. To be most effective, you want to be able to adjust what you do dynamically based on students' reactions. If only the best students participate actively, you risk leaving many other students behind. Here are some ideas for getting information about how well other students are comprehending the material.

In every class there are at least a couple of students with animated faces. I try to identify a few C-level students with animated faces. I use their reactions to pace the class. (Computer Science)

One technique that I use to find out whether people have understood what you are talking about is to nod at them. If they get it, students nod back at you unconsciously, even the shy students.

(Computer Science)

The two strategies above are effective with many American students. However, if a student doesn't nod or show any expression you shouldn't conclude that he or she is confused. For example, students from some cultures may seldom show any expression while others may smile to cover embarrassment at their confusion.

Don't ever believe them when they passively say they "understand." Cover important points twice, even if they look bored the second time around. Looking bored doesn't mean they understand. Try to get students to give clear feedback that they understand – more than just saying, "Yeah, I understand." (English)

Often the subtle cues you can read on students' faces will not provide you with enough information to gauge your effectiveness. Students' direct responses to questions will provide more reliable information. See Improving Participation on pages 60-69 for more ideas about how to ask effective questions.

I make the faster students, who always answer, explain their answers to make sure the slower students still get it. I'll ask the same questions as if it were a student who didn't know the answer and I was leading them through it. I'll ask them, "Why is that the answer?" (Chemistry)

Reviewing for Exams

I've found that even beyond the knowledge that I try to impart, what matters is conveying the attitude that "you need to prepare for this test in a significant way and I am prepared to help you."

Physics, two semesters as a TA

Many students rely heavily on your presentations and explanations just before an exam. Students in introductory courses may have particularly weak study strategies and look to their TAs for information about what

they “have to know.” In courses that emphasize homework and problem solving, students may believe that re-reading the text and studying lecture notes constitute sufficient preparation for an exam. Some TAs view a review session as an opportunity to advise students on how to prepare (e.g., re-work the homework and some related problems) in addition to reviewing major concepts. Other times, such as in courses with essay exams, a review session may primarily be a time when students can ask questions of clarification. In these cases, it is important for students to know whether to expect a review “lecture” or a question and answer session so that they prepare accordingly.

Many faculty members share past exams with students to clarify their expectations. If no exams are available to you and the students, consider discussing other options with the professor. For example, you might draft a review sheet for students and ask the professor for feedback about whether using it would prepare students adequately. In planning to conduct the review session, keep in mind a variety of possible approaches.

Concentrate on the overall strategy. Do they know the steps and the goal? I put a lot of emphasis on a goal and plan. (Physics)

If students rely heavily on problem-solving by analogy to familiar examples, they may fail to see the general strategy. A review session is a good time to emphasize the common issues and approaches to help students deal with any novel problems that may appear on the exam.

I’ve tried different things for review sessions. I start with a brief overview, give the technical “recipe,” and then I take questions. I’ve also tried to pick out great problems, simulated the test environment, and walked around to help when the students get stuck. (Physics)

If students work problems themselves before or during a review session, they benefit tremendously. The practice helps them to find out what they can and cannot do under exam conditions. If you are available for immediate help and feedback, they can more efficiently unlearn errors or misconceptions.

Preparation advice

The important part of preparing is anticipating questions.

Computer Science, five semesters as a TA

How do you know when you are sufficiently prepared for class? Some people feel ready when they have created good notes full of examples and questions. Others review the professor’s lecture notes, read the solution manual, decide which problems to discuss, and determine how to allocate their time to different problems. Your degree of preparation typically has

a huge impact on the quality of your teaching because you have the chance to anticipate what may be difficult for students and how to handle that. Experienced TAs offer the following strategies for preparing to handle an interactive classroom effectively.

You have to know not only the correct way to do things but also how students will do them wrong. So when you see the students going in the wrong direction, you can recognize why it won't work. More experienced TAs know the kinds of questions that come up and ways to figure out how to approach the misconception. In TA meetings we go over these issues. (Physics)

If you don't have a formal weekly TA meeting, consider other ways find out more about common errors or questions. Some textbooks come with instructor's manuals or student guides that you can buy or sometimes borrow from the professor to get some of this information. Some departments maintain a collection of previous instructors' course materials that may include teaching notes you could review.

I try to anticipate how the students might react to specific questions or examples and plan accordingly. That way I look like I'm thinking on my feet when I respond to the students. It has taken me a long time to create the illusion of creativity. (Statistics)

What looks spontaneous to students often isn't spontaneous for the instructor or TA. If you have the impression that your former professors never needed notes, it may only be because they prepared so thoroughly that they didn't need to look at their notes.

Prepare more examples than you can possibly use so that you can keep throwing more examples out until the students get whatever concept you're trying to express. In economics, there are zillions of textbooks. I'm always poring over them, looking for interesting ways of saying things to encourage freshmen. In the research methods class, using lots of examples helps students see the underlying principles. (Social and Decision Sciences)

Preparing extra examples also gives you the ability to respond more effectively and more concretely to students' questions.

You have to be careful about using other people's examples. Other people may be able to carry it off smoothly because they know small relevant details. (Tepper School of Business)

In some disciplines, sharing examples is efficient and can be very helpful as long as you work through the example yourself in advance. However, in some disciplines where examples take the form of case studies or business experience, "working through" the examples may

not be enough. If you don't have direct experience with those examples yourself, you need to be sure you do thorough research and ask many questions in preparation.

I didn't know how much to prepare for class and wound up writing two weeks' worth of material for my first lecture. This turned out to be useful, since I was now prepared for my next few classes, but I simply had no way of knowing how much was enough. After teaching a course this summer, I assume that I can only cover two big ideas in a 90-minute lecture. (Statistics)

Sometimes it is difficult to judge what constitutes a "big idea." One heuristic is to use outlines or hierarchies to judge the complexity of the material. In general, you should have no more than 2-3 points at the top level of the outline.

When a course has multiple TAs, it is particularly important that all TAs provide the same information to students. (Computer Science)

One of the most effective ways to ensure consistency across sections is to have regular TA meetings in which the goals for each class are discussed. Another option for efficiently coordinating across sections is to rotate responsibility for preparing section notes among the TAs. However, remember that you can't use another person's notes "cold," especially if that person thinks about the material differently than you do or if the notes don't include enough procedural details or some questions to facilitate participation.

The checklists on the following pages offer tips on preparing for the first day of class and for guest lectures you may give. Note that opportunities to guest lecture may arise because a faculty member travels or because you request the opportunity to facilitate your own teaching development. If you do not have many opportunities to teach as a graduate student and are interested in a faculty career, you may want to consider offering to give a guest lecture or two as a learning experience before you go on the job market.

The Eberly Center offers microteaching workshops each semester to help TAs and graduate student instructors developing their presentation and interaction skills. See pages 128-129 for a description. For the current seminar schedule, visit www.cmu.edu/teaching/.

Checklist: Preparing for the First Class

- ✓ **Meet with the professor to clarify your role and responsibilities in the course.**
See pages 10-11 for suggested questions and approaches.
- ✓ **Talk with TAs who have experience in this course or similar ones.**
It can be helpful to visit one of their classes if time permits, particularly if you are not familiar with the format of the class (e.g., use of computer labs, small group activities, cases).
- ✓ **Try to remember what it was like when you were learning the same concepts.**
Especially useful is recalling common misconceptions so that you can recognize and address them efficiently. However, keep in mind that you were probably more successful than a typical student and thus may underestimate students' difficulties with the material.
- ✓ **Get the class roster and begin to learn about your students.**
You can begin to learn students' names, note their majors and consider how you will respond to the diversity of the group. Page 17 offers more suggestions on learning names. You might also prepare a Student Information Sheet as described on page 26.
- ✓ **Check out your classroom and begin to visualize yourself and your students in it.**
Having a clear mental image can help to reduce nervousness on the first day. In considering how to make a positive and professional first impression, think about where to stand and what to wear to create the level of formality or informality most appropriate for your role and the level of the students. Talk with others about their approaches to these issues. Be sure to visualize a specific plan for any visual aids you need. To find out what equipment is available in your classroom, see www.cmu.edu/computing/mediatech/.
- ✓ **Anticipate likely student questions or concerns about course policies and expectations.**
If needed, consult with the instructor to clarify any final details.
- ✓ **Plan your introduction to the class.**
Introduce yourself. You might tell students about your own interests in the course material, your educational background, and/or a little about your research area. Also, describe your role in the course and explain how students can get in touch with you.
- ✓ **Determine, in consultation with the instructor, some content to be taught or discussed.**
Students should get a good sample of what this course will be like. If possible, choose a topic that shows particularly interesting questions in the course and that lets you demonstrate how you will teach. Ideally, rather than telling students you want them to participate actively, you'll be able to show them from the start how you'll get them involved.

Checklist: Preparing for a Guest Lecture

- ✓ **Attend 1-2 related lectures by the professor.**
You can see how the professor runs the class as well as learn about the students and what they know.
- ✓ **Talk with the professor about his or her priorities for your lecture and how it fits into broader course goals.**
Especially if you are filling in on short notice, ask the professor if he or she has lecture notes to guide you. As needed, ask about the exact terms or notation used so far in the course to ensure consistency with other lectures.
- ✓ **Locate and read supplemental sources for interesting and useful examples, supporting research, or organizing themes.**
Be sure you have clear goals so that you read efficiently for what you need.
- ✓ **Prepare a good one-page outline to help you see the overall coverage and coherence of your initial plan.**
Usually 3-4 major sections is the right amount of material for a 50-80 minute lecture. You may want to share this outline with the professor to get his or her feedback and check how much flexibility you may have in how you present the material.
- ✓ **Carefully plan visual aids.**
Well-designed visual aids should clearly reinforce the main ideas and be coordinated with what you say. Be sure the writing or typeface is large enough to be seen from the back of the room (usually 18- to 24-point for transparencies or PowerPoint presentations).
- ✓ **Plan ways to interact with students and get feedback on their ongoing comprehension.**
Determine how much interaction, discussion, or in-class practice is appropriate for the goals of the lecture and consistent with the class atmosphere established by the professor. Write at least a few of the questions you plan to ask to make sure that they are clearly worded and answerable.
- ✓ **Expand or review your notes thoroughly so that you feel comfortable and confident in presenting the material.**
Some lecturers find it useful to include reminders to themselves (e.g., "write students' responses on this transparency," "pause here for questions") to make the presentation smooth. Even if you have very good notes from the professor and are familiar with the content, you need to make sure that the level of detail in the notes is what you need.
- ✓ **Allow enough time to mentally rehearse the lecture at least once.**
In this mental rehearsal, check to make sure that the introduction sets clear goals, logical transitions connect the major sections, visual aids highlight your major argument, and the summary stresses the most important points.



Improving Participation

This section examines some strategies for making the classroom atmosphere comfortable, asking good questions, creating and managing the flow of the discussion, and encouraging a broad group of students to become involved.

Because a central goal of recitations and discussion sections is promoting active, engaged learning, the quantity, quality, and distribution of student participation is a major concern for most TAs. TAs are often frustrated when it seems students “just won’t talk” or when the same handful of people regularly carry the in-class conversation while others observe quietly. In general, as more students participate, the discussions become richer and you can see what students understand more accurately, so it is important to encourage broad participation. It is useful to identify some of the possible barriers to more equitable distribution of participation. For example, students may:

- be reluctant to risk making a mistake or sounding dumb in front of their peers
- not be sure whether a question is “real” or rhetorical
- not be properly prepared for class
- not be able to understand why you are asking them questions rather than telling them certain information
- hesitate to answer if they think you are looking for something very specific
- be predisposed to let others do the talking because of their personalities or cultural backgrounds

To create better classroom interactions, instructors and TAs can address these and other barriers to make participation low risk and beneficial so that anyone who wants to can speak up. This section examines some strategies for making the classroom atmosphere comfortable, asking good questions, creating and managing the flow of the discussion, and encouraging a broad group of students to become involved.

Creating a Comfortable Atmosphere

In my first recitation I had a horrible time. I called on the students randomly and they hated me for it. I put them on the spot. They were required to be there. I scared them.

Chemistry, four semesters as a TA

Students can see many reasons to sit silently. Some barriers to participation are a result of students' past experiences in high school classes or large lectures where passivity was the norm. Some of the barriers come from the fact that the classroom has social and emotional dynamics as well as intellectual goals. The following strategies are useful to reduce the perceived risk of speaking up and can benefit other students by making everyone more comfortable with classroom interaction.

I try to be really enthusiastic when people first participate to make it okay for them to ask questions. (Statistics)

Enthusiasm is one of the instructor characteristics which students value most, according to research using student evaluations of teaching. Enthusiasm can be conveyed by positively reinforcing students' efforts with verbal cues ("That's an interesting idea") and non-verbal cues (smiling, maintaining eye contact while the student speaks, writing down key ideas). Failing to acknowledge students' participation in a positive way can inhibit their responses. For ways to get and use responses, see page 65.

Good body language and moving around help, unless you end up running around and acting manic. Making students visually remember that the classroom is supposed to be dynamic helps to keep them awake and active. (History)

Moving around is important for at least two more reasons. First, it influences your pattern of eye contact and who feels included in the discussion. Also, by walking toward students or reaching out to them when you call on them, you can seem much more approachable and friendly.

I do a lot of group activities. I walk around the room while they are doing problems or interpreting data. It increases the energy level of the class. (Statistics)

When students are actively engaged in applying what they are learning, they are often more able to articulate questions or confusions more effectively. If they are working in small groups, they can discuss those issues with each other or you as you move around the room. Many students find it easier to ask questions after trying out their ideas on a peer.

If you have some code to put up on the board, you should not always do it perfectly right. Part of the job is in getting students to identify mistakes. (Computer Science)

Especially in introductory-level courses, students worry about being wrong when they speak in class and are reluctant to take risks. If discussion of errors is a normal and valuable part of class, students are more willing to ask questions, especially about alternate approaches. But, if you plant an occasional error to keep them alert, be sure to tell students you are doing so on purpose!

Strategies for Asking Questions

Looking for the “right” answer absolutely kills a discussion.

Psychology, first-time TA

Effective interactive teaching depends on the ability to ask questions for a variety of purposes and then to make good use of the students’ responses to accomplish the goals for that day’s class. Some low-risk questions can be used just to get participation started. Other questions probe students’ thinking to ensure that their understanding is complete and accurate so that you can provide feedback and further explanations. Still other questions put information in a broader context by using comparisons between theories or examples. The following strategies from TAs suggest different sequences and styles of asking questions. The checklist on page 65 describes strategies for avoiding some of the common errors in using questions.

I’ll ask them for the first step. (Physics)

This opening question is useful for solving problems interactively because it can highlight the process of setting up a problem. There are often many candidates for what is first (e.g., draw a diagram, write down the knowns and unknowns, identify the problem type) and these allow discussion of the problem-solving process as well as the concepts in a particular example.

I get very uncomfortable when students won’t answer questions – just won’t. One thing that helped me get the point across was to ask a series of simple yes/no questions rather than more complex ones. (Statistics)

“Yes/no questions” can be especially useful to assess the overall level of the class quickly because many students will nod silently in response. Also, in discussions, encouraging students to take positions with agree/disagree questions can reveal a useful diversity of views that can propel further conversation.

To start off, I pick questions that I know that they’ll know, then move into more difficult ones. Sometimes they will mouth the answer and then I’ll call on them, or I’ll take a poll. I tell them that it doesn’t bother me to stand up there and wait! (Chemistry)

Organizing questions so that they build in difficulty both increases students’ success early in class and builds readiness and confidence for the harder issues. If you choose to call on someone who hasn’t volunteered, it is very important to give all students time to think and to phrase the question so that you have reason to believe the student can answer successfully or pass gracefully.

When students ask a question, turn it around. Ask them thought-provoking questions. (Civil and Environmental Engineering)

A common holdover from viewing teaching primarily as transmitting knowledge is the temptation to be the expert and answer every question directly. Keep in mind that the questioner may actually know more than he or she realizes and that other students with slightly different backgrounds or experiences might also offer good responses, if you ask them. Turning a question around is a valuable way of encouraging students to address each other directly in discussions.

Some of the best questions and answers come the second or third time around with a student. If an answer isn’t clear, don’t give up right away. Validate their response, but ask them to rephrase or elaborate. Often they are grateful, because they realize they knew more than they thought they did. (Social and Decision Sciences)

Asking follow-up questions in a supportive way can model persistence and show students how to reason about complex issues, both of which are important in learning challenging material. To avoid pushing a struggling student too hard, be sure to watch for non-verbal cues of discomfort such as a flushed face, red ears, or fidgeting so that you know when to move on to another student.

I use a “fishing rod” gesture to let my students know when I’m fishing for a specific answer. (English)

Because many students in introductory courses assume there is always one right answer, they may not effectively distinguish between the different types of questions. The “fishing rod” gesture can be useful to clarify that asking for specific facts or relationships is the exception, not the rule. If you teach a class where questions often have one right answer, you

can try to frame many of your questions in terms of how to approach the problems to make sure there are opportunities for discussing alternatives as well as demonstrating what students understand.

A real question is one you don't know the answer to. (History)

The most provocative questions are often the ones that allow students to engage in discussions to discover or resolve something for themselves. Students often enjoy the challenge of exploring new issues together and are sometimes motivated to pursue these issues in depth in their assignments or out of class discussions.

The Eberly Center offers seminars on conducting productive discussions once or twice a year. For the current seminar schedule, go to www.cmu.edu/teaching/.

Checklist: Better Questioning and Responses

Avoiding Common Problems with Questions

- ✓ **Avoid asking a question and answering it yourself.** Answering your own questions can create the impression that you aren't all that interested in students' answers and may set a pattern where students wait for you instead of responding.
- ✓ **Try not to ask many questions at once.** When students have two or more different questions to think about, the result is often confusion rather than increased participation. If you think students need to see where the discussion is going in order to answer certain questions, it might be useful to write 2-3 organizing questions on the board at the start.
- ✓ **Beware of asking a difficult question too early.** You might think of the initial phase of class as a time to ask questions to understand students' perceptions and difficulties so that you can adjust your questioning strategy accordingly. Consider whether the question is open-ended and takes time to explore or whether it may appear to call for a complex conclusion before the major issues have been clarified. If a complex question comes too early, students may become frustrated and unwilling to participate.
- ✓ **Avoid consistently asking the same types of questions.** A very common error is only asking "Are there any questions?" and not framing a variety of question types to get students to think at different levels about the material. For example, different types of questions can encourage comparisons, probe for evidence, examine cause-effect relationships or invite hypotheses and predictions. The Eberly Center can provide more information on types of questions on request.
- ✓ **Remember to build on students' answers.** Student responses can often lead to interesting questions and implications. Potentially fruitful responses may not always come when you expect them, so taking advantage of these opportunities may involve reorganizing your plans spontaneously.
- ✓ **Include probing questions.** While it is important to avoid putting students in the "hot seat" where a wrong answer is examined in detail, it can be valuable to find out about a student's reasoning for partially correct answers. Follow-up questions that probe how students arrived at a position or conclusion can reveal important conditions or assumptions and may prompt deeper analysis by the whole class.
- ✓ **Be sure to correct wrong answers, but not too bluntly.** Many instructors are concerned that telling students when they are wrong will make them less willing to participate again. However, you also have to make sure incorrect ideas are not propagated. You can soften the impact of a correction by slightly delaying and depersonalizing your feedback so that you are correcting the idea, not criticizing the individual who said it. Also, whenever an incorrect answer has some merit, acknowledge whatever part of the student's reasoning is correct (e.g., "That's a good example of how to use regression. Let's think more about when to use regression. What are the common purposes of this method of analysis?").
- ✓ **Acknowledge answers sufficiently.** Be sure to acknowledge each answer verbally or non-verbally to show appreciation for students' efforts and contributions. One way to validate participation is to write students' contributions on the board. Another is simply to say "good," "yes," or "thanks" when students offer useful responses.

Avoiding Problems with Getting and Using Responses

- ✓ **Give students enough time to think.** A good guideline is to wait at least 3-5 seconds for any question. For many application or analytical questions, you may need to wait 10-30 seconds or more. For some difficult questions, you may want to encourage students to write for 2-5 minutes before you call on someone. See pages 71-72 for more about when you have to wait a long time for responses.
- ✓ **Encourage students to respond to one another.** If you ask open-ended questions to which several students respond, you may want to wait until the end of a sequence of responses and then summarize the main ideas to show their value without interrupting the flow of student-student interaction. Or, in a lively discussion where more than one student has his or her hand up, prioritize those who want to respond to other students' remarks.

Balancing Control and Flow

Leading discussions is difficult. There's a tension between needing to have the discussion going in the "proper" direction and just wanting the discussion to go somewhere ... anywhere!

English, five semesters of teaching experience

How do you judge whether or not a class is going well? Most instructors are more satisfied with classes where many students participate and where the discussion "flows" with few silences or discontinuities. However, we also want to make sure that the most important points are made clearly and with appropriate emphasis, so finding the proper balance between these goals requires promoting flexibility without sacrificing your own priorities for what students should learn. Experienced discussion leaders suggest the strategies below to balance control and flow.

It's important to get in mind two or three points – that's all! – that you want to get across before you even get to class. This way you can let the class take on its own life for that hour. Sure, tangents will happen. But with such a short list of major goals you can always get back to them.

(History)

If you post your 2-3 major goals or guiding questions on the board, you can often more easily end tangents and draw students' attention back to the main points by reminding them of the priorities for that class. Without a clear sense of the priorities and learning objectives, you may find that you will follow students' leads so much that the overall goals do not receive enough emphasis.

I always make a minor back-up plan just in case the things I think will interest them fall flat. You need to have a variety of options to fall back on. (English)

Many instructors and TAs feel tension if things fall flat and some begin to lecture to fill in the silences. While there is a place for very brief lectures to provide background information and context, lecturing usually interrupts the flow of a discussion and inadvertently "teaches" that you'll tell students what they need to know. If part of the course goal is to teach students to think critically on their own, it is best to keep lectures to a minimum during discussions. Instead, base your back-up plan on a new line of questioning or an in-class activity to generate interest.

I try to develop a number of questions on the same issue, variations on a theme that I can keep coming back to. (History)

Be sure that you have prepared a variety of questions that include different levels of abstraction, different contexts or examples, and different ways of linking new material to students' prior learning. If one question

doesn't produce the kind of responses you need, consider whether shifting levels or contexts may be useful in guiding students' thinking. Note that most TAs and instructors find this kind of shift difficult to do without advance planning of a variety of questions.

"Smooth" to me means ready to shift gears and go where the students need you to go. (Social and Decision Sciences)

Sometimes students open a different line of questions than the one you planned because they can raise a comparison or example that you didn't foresee. Sometimes you need to follow up students' questions because they reveal misconceptions. Preparing well and anticipating students' interests can help you minimize difficulties with shifting gears as needed.

I'm now trying to build off of good student answers to increase student-to-student interaction. At first, when I got a good answer, I'd assume we'd covered a point, so I'd move on. Now I try to use responses to get more responses. (History)

For example, you can look for agreement or disagreement with controversial responses or ask for additional examples to reinforce key points. You can also probe for the reasoning that led to a good response to reveal key assumptions or to introduce interesting exceptions.

Which Students Talk?

It can be difficult to wait for the quieter students to respond because there are always a couple of strong students who will always answer first.

Mathematical Sciences, first-time TA

A common concern among TAs and instructors is how to get a broad group of students to participate regularly in class. In general, calling on the first hand to go up favors the fastest, most assertive students. Many students may be equally able to answer but prefer more time to reflect or want to avoid being cut off in a competitive rush to be the first to answer correctly. For example, women in technical fields often perceive an uncomfortable competitive atmosphere in their classes because others tend to interrupt them and may get credit for their contributions. To avoid setting a pace or tone that may leave many students out, try to view participation from a variety of people in the class as a way to get accurate feedback about what students generally want and need. Below are a few TAs' strategies for encouraging a broader, more equitable distribution of participation.

I often have a problem with the student who always has their hand up for every question. Discussion should be discussion, not just one person's dialogue with me. After class, I take them aside and ask them to give other students a chance. Also, while in class, I walk around a lot,

try not to make too much eye contact with those students, and look toward others when asking specific questions. (History)

Individuals who are very comfortable speaking up in class are not always aware that they are dominating class time. By talking with them outside of class you can acknowledge their enthusiasm and also recruit their assistance in getting others involved. For example, you can tell these students explicitly that if you look elsewhere when they have their hands up, that just means that you want to hear from other students, too. By letting them in on your strategy, you can avoid dampening their enthusiasm.

To get students who seem quiet to participate more, I make an effort to chat with them before and after class and ask them direct questions. Also, when groups interact in class, I try to walk around the room before they present their answers and observe the group process to make sure everyone is participating. If not, I ask the quiet folks for their view, and then the group usually incorporates it. (Tepper School of Business)

Quieter students are often more comfortable with one-on-one interactions or in small groups. By interacting with these students in these more relaxed settings, you can get to know them better and also potentially build their confidence for speaking up in larger group settings.

I don't want only the graduate students in my class responding. You have to call students by name. Otherwise, the same two or three students will answer. (Chemistry, TA for an upper-level course)

Being able to use students' names in a friendly way makes it possible to include the less experienced students (or simply the quieter students) in a non-intimidating manner. Since being called on by name to answer unexpectedly can be intimidating for some students, always try to look for students who seem ready (e.g., those who make eye contact with you, lean forward, or nod in agreement as you talk).

I'm concerned when women students undermine good points they are making by using qualifiers (e.g., "I'm not sure if this is right but...") or by raising their voice at the end of a statement, which then sounds like a question. I talk with these students outside of class about gender differences in communication and offer to help them develop a more confident speaking style by giving them signals when I notice a problem in class. (History, faculty member)

If you notice a pattern of women participating less or getting fewer opportunities to be heard in the discussion, you might want to learn more about ways to help both the women and the men in the class to communicate more effectively. The Eberly Center conducts discussions on these issues and can recommend related reading.

What concerns me is making sure I deal with the people who I don't know as well on equal footing with those students who I already know and who maybe are my friends. You might just be more naturally inclined to deal with the people and engage them more if you already know them. (Psychology, undergraduate TA)

Even if you don't initially know anyone in your class, it doesn't take long to get more comfortable interacting with the regular participants than the quieter students. To avoid perpetuating a pattern where the same few people talk in each class, be sure to ask for a variety of participants in the first couple of classes (e.g., "Let's make sure we hear from lots of different people. How about someone we haven't heard from yet?").



Strategies for Difficult Situations

In this section, we provide strategies from TAs for TAs for situations like:

- When you have to wait a long time for responses
- When students have misconceptions
- When students seem unprepared for class
- When you can't prepare adequately for class
- When you need to explain a complex problem

When your students' backgrounds vary or are weak

Offer to review the material if they can't remember what is needed.

(Chemistry)

If a large enough number of students need a review, you might schedule an extra review session or prepare a handout of key points and resources. If a few students lack important background, meet with them individually to develop a plan to help them catch up in a timely way. You may want to discuss the options with the professor and make sure he or she is in agreement with your choice.

I have seen students who could not draw a line given an equation. I don't think that it is appropriate to spend my TA hours teaching high school math. I say, "It might do you some good to have access to a basic algebra book as a refresher." I hate to see people struggle with their homework, not because of the economics content, but because they are struggling with, for example, what an absolute value is. People seem receptive. (Heinz School)

Especially for upper-level or graduate courses, you can suggest that students assume considerable responsibility for reviewing material they need but haven't mastered before.

I come across a huge range of proficiencies. In an early course evaluation, some students thought the class was too slow; others thought it was just right. Some are very visually oriented; others don't have a clue. My challenge is to keep those who are visually oriented challenged, while teaching those who aren't.

(Design, teaching a course for non-majors)

If you know students' skills vary widely, it is useful to monitor your plans for each class to make sure the examples and levels of explanation vary widely, too. The strongest students will need some opportunities to "stretch" to stay interested and may benefit from explaining their perceptions and interpretations so that other students learn from more able peers.

When you have to wait a long time for responses

Being an impatient person, it was difficult for me to wait the 30 seconds or one minute for them to respond. I just stare at them. Silence is stronger than anything I could say. (Physics)

It helps to imagine what can happen while you are silent. Some of the time is needed for students simply to recall (or look up) the information that might be relevant to the question. Some time is needed to decide which parts of that information are relevant and which aren't. Some students need a few extra seconds to decide whether it is worthwhile to try to answer themselves or just to let others do it. A few will mentally rehearse their answer to make sure it sounds clear enough. All of this thinking (and waiting) may be needed before one hand goes up.

You have to give them a lot of time; otherwise you'll answer your own question. You have to give them time, not only to realize that you are asking them a question but also that you really do want an answer from someone in the crowd. Make waiting a habit. Then they expect that they will have to participate. (Mathematical Sciences)

For some unmotivated students, class can turn into a game of trying not to answer questions so that the TA does all of the work. Especially early in the course, make sure you wait a long time so that students know you want and expect their involvement.

I wait until they roll their eyes. (Chemistry)

By the time they roll their eyes, students have usually thought as much as they can (or will) about your question. If it's hard for you to wait this

long, plan things to do to fill a few seconds: count silently, scan the room to make eye contact with everyone, erase part of the board, take a sip of coffee or water, walk to the other side of the room, and repeat the question. All of these activities can enable you to wait more comfortably.

If the students are silent, then I move closer to them and they often talk. (English)

Sometimes the physical setting of the classroom sets up barriers to participation. If you teach in a lecture hall or any room in which you are far away from some students, be sure to reduce the distance between you and them often. Otherwise, you may inadvertently come across as rather formal and potentially intimidating.

When students have misconceptions

When several mistakes are very similar, I will tell students these are common mistakes. (Physics)

Students' misconceptions may have many different origins, including simplifications made in high school courses and naive observations of everyday experience. Sometimes you may want to prepare a handout to explain the concept in greater detail or to provide supplemental examples to clarify the common misunderstanding. Also, it is useful to talk with faculty and more experienced TAs to help you identify these common mistakes more easily.

After class I would take the extra time to figure out where their logic went wrong. (Chemistry)

As you become more expert in your field, you may find it increasingly challenging to recall what can be confusing about the material. Occasionally, when a student asks a question in class, it will reveal a significant but unusual misconception that you can't analyze immediately. In this situation, it is better to talk with the student one-on-one than to spend time in class trying to pinpoint the problem. You can invite the student and others who may be interested in the question to hang around after class or come to office hours.

When students seem unprepared for class

It's hard to teach when people don't want to discuss the material or haven't read it.

History, seven semesters of teaching experience

I do some pre-planning to urge students to participate when they generally don't do it on their own. I use the discussion board feature on Blackboard. A day or two before we meet, I post to the whole group some general questions to consider related to the readings, and then send separate

messages to a few other folks asking them specific questions to raise with the class if I think they've been thinking but not talking. (History)

If students are not able to answer your questions, that may be because they didn't read or prepare at all or because they read the material with the wrong focus in mind. By providing guiding questions, especially for first-year students, you enable students to read more effectively. For more advanced students, you may want to ask them to write questions for discussion as homework.

Options I use to get people motivated are to give them short writing assignments or assign discussion questions. (English)

If you can't assign work for credit in your course, another option is to give students about 5 minutes in class to write in response to a key question, problem, or quote in order to improve their preparation somewhat before discussing important issues. Note that these methods work best when students bring their books to class as reference materials.

When you can't cover enough in class

Sometimes faculty say something will be covered by TAs and the TA is expected to teach new material. It takes a lot of time. Often one hour in recitation isn't enough and some questions have to be dealt with by asking students to come to office hours. (Tepper School of Business)

What kinds of questions should be deferred to office hours? In general, questions that are primarily review or are of interest to only a few students are good candidates. If you find that you are getting more questions than you can handle and still accomplish the course goals set out by the professor, you may need to discuss how to set priorities with the professor.

One option is to do an extra recitation during office hours. Half the class turns up when I do this. I start off by asking them what questions they have. It ends up being the way the recitation should have been in the first place. (Computer Science)

Also, announcing specific topics that you could discuss or review in office hours can help students by reassuring them that their needs are a legitimate use of your time.

It is important to make clear when you haven't been able to do justice to the topic. (Chemistry)

Sometimes the schedule requires you go on to new material when you have only just begun a topic you view as interesting or important. When this happens, put in context how much they might still learn on their own or in future courses. Without this information from you, students may be unaware of some interesting and complex issues in the field.

What kinds of questions should be deferred to office hours?

If there are two sections, talk to the other TA so that you know what they plan to cover. You need to know that there are always things that you will not be able to teach. (Computer Science)

These conversations are valuable in setting priorities when you have to choose what to emphasize.

You can use the Blackboard page for your course to put up example problems or extra help. (Civil and Environmental Engineering)

I explain problems that are hard on the course Blackboard page. (Chemistry)

If you want to make regular use of online resources for your class, be sure to remind students in class the first few times that you make information available on the course Blackboard page so that they learn to check there for help with their questions.

When students in required courses seem disinterested

It is hard to maintain enthusiasm in the face of studied apathy.

Physics, four semesters as a TA

Anytime I can link what we're doing in class to larger goals in life, I do. I acknowledge that, in the grand scheme, my course isn't all that important, but I try to help them see building blocks that will be useful in the future. (English)

Foundation courses in many disciplines can appear abstract and only remotely related to students' goals. For many of these courses, you will have experience to draw on to show the value of key concepts in later courses, work experience or everyday life. When personal experience isn't useful, be sure to talk with experienced faculty and TAs about examples that can show the relevance of basic concepts and skills.

Never give them a chance to relax. Keep the class awake; get them involved. I'm always calling on people by name. People who aren't involved lose motivation quickly. I have students talk back so I don't get bored myself. I start to look like I'm having fun when they are involved. (Physics)

Calling people by name can improve the atmosphere for participation and convey enthusiasm for active learning. You can either selectively call on those who look ready to speak or keep a very light tone so that failing to answer isn't perceived as embarrassing for the student (e.g., "Jean, do you want to try the next step in this process?")

When I look back on professors who were really good and motivated me, the good professors had something more to say than the book.

(Physics)

While it is tempting to become cynical and assume that students never read the book, having a few examples or elaborations that go beyond the book can remind students that introductory material doesn't have to be as dry as many texts are.

Where I have a little more freedom, I can give them extra credit problems. I can say, "Go into an elevator and do this and tell me what happened." I can get them to do things that really are just fun. (Physics)

Even when extra credit isn't an option, some students appreciate ideas for experiencing the concepts first-hand.

When I work with students, I try to be more excited than I really am. It's tiring, though. (Biological Sciences)

Sometimes just a few unmotivated students can hurt your motivation for TAing a particular class. Since it is important for you to keep your morale high for the other students, you may want to make a special effort to reach out to those students by talking with them more – before and after class, making small talk in office hours. The most important goal is to show enough enthusiasm that students know that their class time is valuable and that you won't give up on teaching just because some students seem disinterested.

Most students appreciate a happy TA. (Chemistry)

Even when you can't generate much excitement about the material, you can show students that you still enjoying the process of teaching and interacting with them in class. A smile goes a long way toward showing that enjoyment.

When you can't prepare adequately for class

Just be honest with the students if you didn't get the homework assignment in time to prepare for recitation. I say that I just got the homework and immediately get back to answering their question.

(Chemistry)

Sometimes problems in communication with the professor or other TAs can interfere with your ability to be ready for class. Or, you may have other responsibilities that had to take precedence. If the latter is the case, don't explain in detail or indicate that your research is more important to you than teaching. Simply apologize, do your best, and don't let it happen again if you can avoid it.

When you need to explain a complex problem

Cutting to the core of the problem can be difficult. There is not one right way to approach problems but there is definitely a small set of simplest ways to approach them. (Electrical and Computer Engineering)

To identify this set of simplest approaches, you both need to know the material very well and to look actively for multiple ways to solve the problems.

Flexibility about how to approach the problems is key.
(Mechanical Engineering)

In addition to flexibility in how you solve a problem, you may also need flexibility in how you interact with students while you explain the solution. You may need to be able to break the problem into components, switch from equations to graphs, and get students to talk about each component before they can see the entire solution.

To get to the heart of the problem, take out the numbers, use variables to get it down to the core concepts. Sometimes students confuse math tricks with the concepts. (Civil and Environmental Engineering)

Sometimes taking out numbers is an act of simplification. Other times it makes the problem more difficult because it becomes more abstract. To give clear explanations of complex material, try to identify whether the math, or something else, acts as a distraction from the central concepts and then look for simplifications to remove the unimportant elements.

Topics that are quantitative don't always develop reasoning skills. If they don't know where a solution comes from, then I show the governing equation and reason through it enough for them to build some conceptual understanding. (Chemistry)

When the room doesn't fit the needs of your class

I have a room right now that is very deep but not very wide. This poses some specific teaching problems. There are times that I want to circle people up for discussion, but it's difficult to do that if the room itself is not going to cooperate. (Psychology, undergraduate TA)

Unfortunately, problematic classrooms are fairly common on most campuses and space constraints can make it difficult to switch rooms. At the beginning of the course, it is useful to acknowledge how problems affect the class and enlist your students' help in dealing with them. Students are often willing to regularly move their chairs forward to alleviate crowding or to sit in the front half of a large lecture hall to make it easier to see and hear. For information on room repairs, see page 135.

For information on room repairs, see page 113.



Assisting in Laboratories and Studios

This section provides strategies about two issues that experienced TAs find challenging in these settings:

1. Asking questions as a way of teaching reasoning and independence and
2. Learning how to prepare for a teaching-learning environment where you will be answering a very wide variety of questions.

Perhaps more than other educational settings, labs and studios present situations where students can be overwhelmed by the new environment and the independence typically expected of them. Students may have their hands full (literally) with work and feel some pressure to complete it in the allotted time. Some of the students will not be able to feel comfortable enough to approach you with questions, even when they clearly should be asking for guidance. Others will be so overwhelmed that they may look to you for constant reassurance. A few may be looking for quick answers and approval for shortcuts rather than focusing on learning from the experience.

Lab and studio courses share common pedagogical goals because both settings involve students actively applying their newly acquired knowledge while faculty and/or TAs are available as guides. Among the major goals in this TA role are:

- monitoring students' work-in-progress and asking helpful questions to promote reflection and keep students focused on the objectives
- providing feedback when students ask for it and at other specified times

- highlighting the relevant theory and how the procedures and techniques for a given assignment help students to understand it better
- facilitating the development of the skills, attitudes and habits necessary for professional success, such as keeping an appropriate lab notebook or process journal
- teaching the underlying processes of the scientific method, statistical analysis or the creative process

This section provides strategies about two issues that experienced TAs find challenging in these settings: asking questions as a way of teaching reasoning and independence and learning how to prepare for a teaching-learning environment where you will be answering a very wide variety of questions. The checklist on page 82 summarizes issues that are particularly important in laboratory courses in science and engineering and are also relevant in computer labs in a variety of disciplines.

Asking Questions and Encouraging Independence

I need to give them the big picture. I need to provide meaning to what they are doing.

Mechanical Engineering, one semester as a TA

The important goals above can be undermined if students are able to take a “cookbook” approach to their work where they simply follow directions without reflection and critical thinking. TAs’ activities can keep students focused on learning, not just on getting the work done. In order to help students learn to answer their own questions and develop the independence and confidence they will need as professionals, you need to balance giving answers with asking questions.

Clearly, some students’ questions are pragmatic requests for information to help them simply move ahead – these can be answered quickly and directly. At other times, you will have to use your judgment, based on the difficulty of the task and your knowledge of the individual student, about whether to give an answer or ask some questions. For example, if a student’s question is stated in an ambiguous form, you might ask the student questions to clarify his or her plan and uncover missing steps or misinterpretations of instructions. Some additional kinds of interactions, discussed below, are especially important to enhance learning in labs and studios.

When teaching a lab, if you approach students and ask if they have any questions, half the time they do. They are just reluctant to approach you. (Chemistry)

The checklist on page 82 summarizes issues that are particularly important in laboratory courses in science and engineering and are also relevant in computer labs in a variety of disciplines.

Effective TAs make it a point to circulate around the room so that they can make small talk with students (“How are things going so far?”) and so that students can easily get their attention as needed for feedback or information (“Should the product be this color at this stage?”).

In labs the problem is that they don’t know that they don’t understand it until they write it up later. I’ll ask them questions when I sign their lab book. (Chemistry)

Part of learning about the scientific or creative process is maintaining a notebook properly. For labs, this notebook serves as a record of procedures and results, including explanations of unusual events. For creative work, students may be asked to keep sketches and record notes about breakthroughs in their work. You can use what they have (or haven’t) written about to prompt questions that promote further interpretation and integration of their learning.

I think it’s very important to offer a lot of positive feedback about the progress (however little) that your students are making. Lab can be very foreign to students and positive reinforcement can help them feel better and therefore do better work. (Biological Sciences)

Lab work can be very discouraging for novices because every new procedure can seem to take an eternity and every error seems like a major setback. Noticing and commenting on progress such as a nice-looking result or improved technique are outstanding motivators for students.

Preparation Advice

I remember being lost when I was new. I remember telling students things that weren’t quite right or weren’t really answering their question.

Chemistry, three semesters as a TA

Even though you may not be getting up in front of the class to give a long presentation, working as a lab or studio TA requires significant preparation in order to make the learning meaningful and to answer the diverse types of student questions. You may need to give a very short pre-lab introduction to focus students’ attention on the most important issues and procedures. You may have to answer questions at many levels of detail and need to think both quickly and flexibly to decide what level of detail your response should have. For example, a student may ask about a “picky” procedural detail in a way that might reflect misconceptions about the purpose of the assignment. Or, a student may describe his or her understanding in imprecise language, but point out an important methodological problem in the process. In both cases, the nature of your preparation could determine whether the student gets a “quick fix”

response or something deeper. The following priorities in preparation are offered by experienced TAs.

It is important to know your way around the lab.

(Mechanical Engineering)

Students' questions can vary from basic facts like where to find supplies and how to use a new tool to more subtle questions about what to do if a computer or equipment isn't working.

It is important to do the experiment yourself.

(Mechanical Engineering)

Many TAs have trouble making time to do all of the experiments themselves, but there are many benefits to making this a priority. Most importantly, doing the experiments yourself is the best way to identify the kinds of pitfalls students may encounter such as misreading the manual, rushing a particular procedure inappropriately, or not being able to detect when a specified condition has been reached. Completing the experiment yourself is the best way to be thoroughly familiar with the students' options and likely difficulties.

In the computer labs I've had to prepare, I went into a lot of detail so that, if you follow step by step, the handout tells you what you'll type in. This lets students understand the concept but not be bogged down in mechanics. It gets them to the conceptual stage.

(Tepper School of Business)

Computer labs can require extensive preparation to ensure that the instructions are up-to-date and working with frequently changing hardware and software. For introductory-level students, the instructions might include some questions designed to check that students understand the purpose and significance of various steps. If students are unable to answer these "checkpoint" questions, that prompts them to ask you questions. For upper-level students who have a clear professional need for learning particular software or analytical techniques, a few key questions can be discussed informally with individuals or pairs while they work.

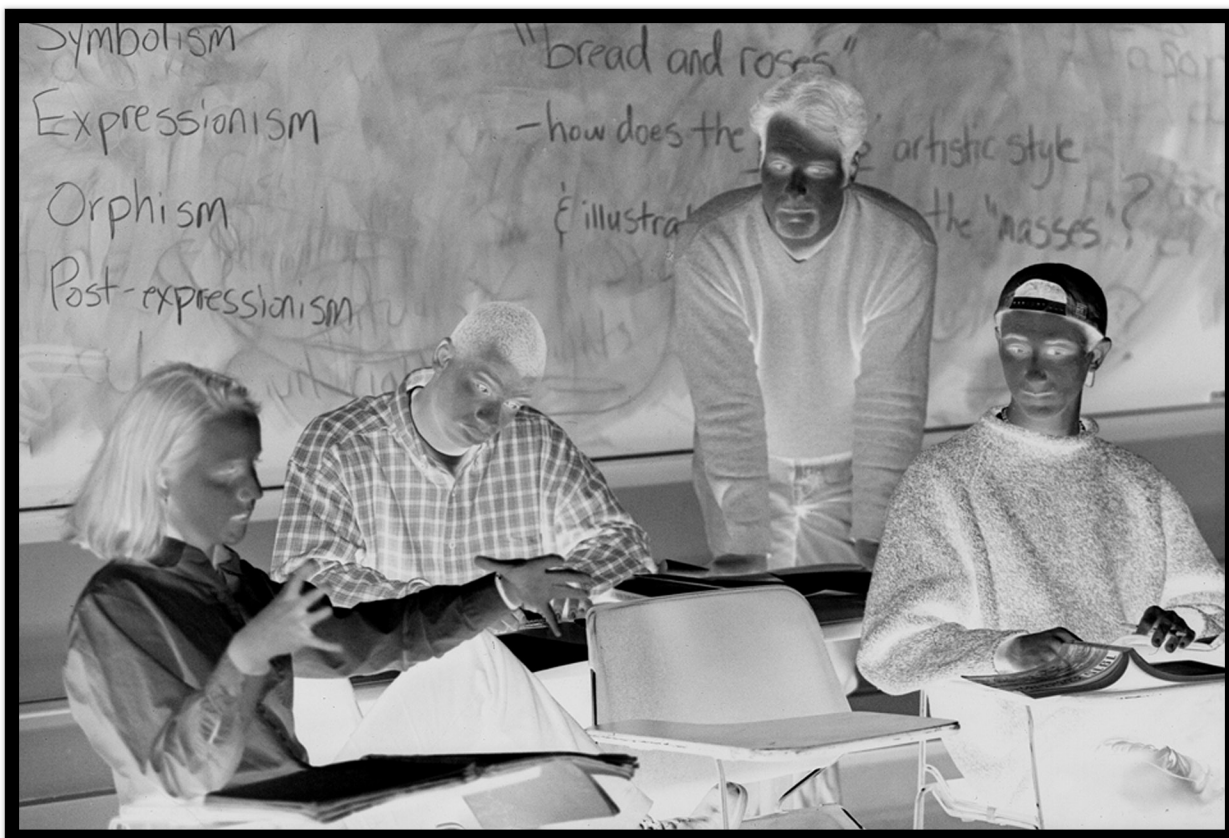
If you're a TA in lab and there are multiple sections, talk to the TAs for the earlier sections and listen to where students are going to mess things up. Then you can address those issues before lab starts.

(Electrical and Computer Engineering)

Other possible goals for an introduction to the lab include reminding students of the purpose of the assignment in conceptual terms, clarifying any deviations from the assignment or manual, and highlighting the steps where they may need to spend the most time so that they can plan accordingly.

Checklist: Being Proactive in Lab

- ✓ **Walk around the room.**
A TA who watches from the corner of the room doesn't seem very approachable or enthusiastic to students. Especially in a computer lab, you can only monitor students' work at a fairly close proximity.
- ✓ **Compliment good work.**
Noticing nice results or improved technique helps keep students motivated in an environment that can be intimidating.
- ✓ **Ask students questions like "How is it going?" as an innocuous opener.**
They may answer that things are fine, but they often have a question or something they'd like to double-check with you.
- ✓ **If you do a quick demonstration, be sure to let students practice, too.**
If possible, coach students while they try something new themselves rather than showing them how right away.
- ✓ **If you don't know the answer to a question, talk to the professor or an experienced TA to find out.**
If you give a student the wrong information, it undermines your credibility very quickly.
- ✓ **Make sure you know where the relevant equipment and supplies are.**
Whether or not you are the person responsible for setting up the lab, students expect you to be able to answer questions about the materials they need.
- ✓ **Give students tips to make them more efficient.**
Students in lab often work under time pressure. Saying something like "You should go ahead to step 4 now because there's a long line for the instrument you need in step 3" can help students to cope and plan more effectively.
- ✓ **Ask enough questions to help students understand how to deal with mistakes.**
A short sequence of questions (e.g., "What's the purpose of the procedure?" "Does the mistake matter for that purpose?" "Why would excess solvent matter in general?") can model systematic critical thinking. But don't ask too many probing questions if the student must rush to recover from a major error without falling behind.
- ✓ **Help students avoid errors that may cost lots of time.**
You may need to repeat an announcement a few times and check on students' progress more frequently if everyone must get to a certain stage in an experiment or project on a given day.
- ✓ **Know how to handle emergencies.**
Safety is always a top priority and, while major accidents are rare, errors with minor injuries are fairly common.
- ✓ **Enjoy the one-on-one interaction.**
Take advantage of the time to get to know students. Many will view you as a potential mentor.



Managing and Facilitating Groups

The ability to work effectively in groups is one of the most valued skills for college graduates today. Teaching students these skills requires instructors and TAs to consider carefully how students should work together to accomplish the goals relevant to their courses. Sometimes groups can work together on long-term projects and other times on short in-class assignments. For project courses where students plan and implement solutions to real and complex problems, students must learn how to structure an ill-defined problem, how to communicate with one another, and how to manage their time as well as the project itself. In other courses, like software engineering, students work in teams for the practical reason that interesting problems are simply too big for one person to tackle.

In some disciplines, such as management, interpersonal skills are among the core skills to be mastered, so students often work in groups in order to reflect on and analyze their own experiences in light of the course concepts. Finally, instructors and TAs can incorporate short group activities in their courses in order to provide students with opportunities to practice articulating course concepts and principles and to increase the

This section offers some strategies for supporting groups and teams in project work and for incorporating group work effectively into your recitations or discussion sections.

opportunities to give students timely feedback on their ability to apply the course material. Other benefits of group learning have been identified by research on collaborative learning:

- Students learn from giving explanations to each other so that the more able students benefit from collaboration along with other students.
- Students get opportunities to learn from other students with different backgrounds and abilities.
- Students can actively work through concepts and problems in discussion with peers rather than reading or being told.
- Students can develop better communication skills including how to give each other constructive feedback and how to resolve conflicts.

Of course, merely putting students in groups to work together doesn't create these benefits automatically. Many students are frustrated by poorly structured or poorly facilitated group projects. This section offers some strategies for supporting groups and teams in project work and for incorporating group work effectively into your recitations or discussion sections.

Providing Structure and Feedback on Projects

Long-term projects present both logistical and intellectual challenges for many students. For undergraduates who may be working as a team for the first time, finding a time to meet and keeping track of group decisions may be difficult. For graduate students, especially those in professional degree programs, group work is quite common, but challenges emerge in working with a diverse group of peers and maintaining effective and efficient communication. In some courses, you will attend group meetings to provide feedback and guidance. TAs can assist with the management of group processes by discussing organization and communication strategies with students early in the project.

When students face complex projects, you can reasonably expect that some will flounder without some structure from the professor or from you. Much of this structure may be outlined by the professor in terms of interim products students must submit for feedback or grading. If your TA assignment involves meeting regularly with groups in or out of class, then you may also want to find additional sources of structure to keep students on track and provide ongoing feedback. Some experienced TAs find the approaches below to be useful.

I have been a TA in project-based classes on three different occasions. As a TA it is absolutely important that I always stay one step ahead of them. This is not always easy. (Computer Science)

The checklist on page 86 provides some advice you can give students to make their group meetings more effective.

If you can focus on the step beyond where students are focused right now, you can help them fit the components or stages of their work together and increase the groups' efficiency. You do not have to be immersed in all of the details of each project, but being knowledgeable enough to help them maintain their priorities is something you can do that group members generally cannot do for themselves.

You need to recognize what you are teaching in project-based classes. You are teaching students how to manage a project and how to manage their time. You need to tell students that it is natural for them to feel confused. I usually provide general guidelines about how I would organize the project. However, I refuse to chase after them. I will not help them with their deadlines. They have to do it on their own. I tell my students that they should talk to me at the first signs of trouble. If you can insert milestone markers in the project, it makes the job of dealing with deadlines easy. (Computer Science)

One learning theory relevant to the project manager's role suggests that you can view your contribution as a "scaffold" for their learning. You provide just enough structure (such as either written or verbal checkpoints) to get students started, to prevent disasters, and to keep them on track. To make sure that students can recognize the first signs of trouble, you may need to provide some concrete examples (e.g., a client or host organization doesn't have time to meet with the group when needed, the group can't agree on the first steps in their background research).

I make students present their progress on the project to the class. This adds pressure because they do not want to look like idiots in front of their peers. I also make sure that everyone in the group is involved in the presentation. (Computer Science)

Public accountability can be a powerful motivator to make a group cohesive. The addition of individual accountability, either by making part of a presentation or authoring part of a report or system, helps to reduce the problem of "free riders" who do not perform their fair share of the group's work.

Something we do is to assign roles (leader, documentation, etc.). Of course, the nature of the class makes this work. (Computer Science)

For long-term projects, other relevant group roles might include editor, critic, recorder, and liaison to an external client. Some instructors prefer to assign roles to particular students if they have enough information about what will work most effectively. Unless you have very good information to guide the role assignments, it is generally best to let students choose their own roles from among those you designate.

For ideas about useful meeting roles, see page 86.

Checklist: Tips for Students on Effective Group Meetings

- ✓ **Meet regularly at the same time and place.** If possible, choose a room with a blackboard or flipchart to record key ideas or group decisions.
- ✓ **Do not have meetings that are more than 90 minutes long.** Longer meetings are difficult to fit into everyone's schedule and may inadvertently encourage late arrivals or early departures that can undermine group cohesion.
- ✓ **Prepare and distribute an agenda before the meeting.** Clear goals allow the group to make good use of their time together and can remind group members to complete important preparation prior to the meeting. To encourage good timekeeping at the meeting, allot approximate times for each agenda item in advance.
- ✓ **Use meeting roles.** Commonly used roles include facilitator, time keeper, note-taker, and observer. These roles provide a structure that can increase participants' awareness of group dynamics and increase the efficiency in achieving the goals of the meeting. Roles should be determined prior to the meeting and shifted among group members over a long-term project.
- ✓ **Encourage equal participation.** Groups can agree on norms for meeting attendance and participation (e.g., notify all members if you can't arrive on time). Facilitators can monitor who contributes to a discussion or decision and be sure to solicit input from everyone. All group members can take an active interest in how tasks are divided and assigned so that work distribution is equitable. An early discussion about how to ensure equal participation can reduce group conflict later.
- ✓ **Allot 5 minutes at the end of the meeting to discuss the group's process.** This very small time commitment allows the group to address potential communication problems quickly. For example, did the discussion stay on track and on time? Was everyone involved in the decision making? Did group members avoid interrupting each other?
- ✓ **Send minutes of the meeting to all group members.** Many groups have difficulties because of miscommunication about what was decided. If the group has a note-taker, he or she can write brief minutes to summarize key goals, status reports and any delegated tasks, and distribute them via e-mail.
- ✓ **Expect to learn from each other.** Most group projects involve working with peers whose academic, professional and personal backgrounds are diverse. Take advantage of diversity among group members in generating creative ideas, capitalizing on individual strengths and experimenting with different methods of accomplishing the group's tasks.

Facilitating groups in class

Group activities are an increasingly common way of promoting students' active engagement in lectures, recitations, and discussions. One reason for their popularity with many instructors is that they can be flexibly adapted to fit different objectives. Students can work together in class for various lengths of time and with various levels of formal structure, depending on your instructional goals.

- You might ask pairs to work together for as little as 2-5 minutes to compare homework solutions or plans for writing assignments in order to help them identify shared questions that you can discuss as a larger group.
- You can give groups of 3-4 students a problem to solve or a short document to interpret for 10 minutes and then reserve enough time for each group to report their ideas and discuss differences in their approaches.
- You can ask different groups to discuss slight variations of a common scenario or problem and then ask a student from each group to explain their analysis to the rest of the class.

To be effective, group activities need an active facilitator who keeps the students on track. The instructor or TA needs to play each of the following roles:

- set clear expectations about the task and outcome of the group's work; for example, by describing any written product to be turned in at the end of the exercise or any brief report to be given to the class
- monitor each group's progress; for example, by observing and talking briefly with each group
- manage the physical environment so that group members can see and hear each other and easily share written work
- intervene to ask questions or provide guidance as needed

The strategies below offer further details for effectively implementing group learning.

In my course, one of the recitation sections each week is devoted to group work on "review questions," which are single-concept problems of intermediate difficulty that provide a systematic review of the key concepts of the current chapter. Group work is followed by general discussion to bring out additional issues. This review session comes after the chapter has been completely covered in lecture, but before the students work on the written homework assignment consisting of larger-scale problems that often involve many different concepts. (Physics, faculty member)

The checklist on page 90 provides some guiding questions to help you plan and facilitate successful group learning activities.

This use of groups in recitation provides valuable practice opportunities in which students can discover any misunderstandings they may have and get timely answers to their questions before trying homework on their own. This approach helps students to learn more efficiently from early problem-solving attempts.

In the recitations of some of the introductory physics courses, we use student group work in either a structured format, with students working in groups of three solving assigned problems and being monitored by the TA, or more informally, by allowing time in the recitation for the students to set up the given problem and work on it individually or in a group before the TA solves it. It is very important that each student is fully engaged in working on the problem and is guided and monitored as effectively as possible by the TA.

(Physics, faculty member)

The size of the group can vary from two to four depending on the complexity of the problems and the TA-student ratio. In general, one TA can effectively monitor about 5-7 groups who are working throughout a 50-minute class. For shorter activities of 10-15 minutes, it may be possible to monitor only 3-4 groups carefully, so you need to choose those groups according to who most needs your attention. Note that in some recitations, students write solutions on portable white boards, which both helps group members focus on a common goal and helps the TA quickly assess which groups most need attention.

When we used cases in class, I would divide students into groups to have them talk about the case, decide on a few major points, and then each group would present to the class. Some days I would walk into class with flipchart paper and markers, divide them into groups, and have them apply some of the concepts or theory to a real world example. Then we would tape these to the chalkboard and they would present them. The important thing is that sometimes the groups need to be chosen randomly and sometimes not, to get students to interact with many people in class, not just their friends.

(Tepper School of Business)

Some TAs are concerned that when you put students in groups they will be more inclined to socialize than work. This example shows two important strategies for preventing this problem. First, groups must prepare to report the outcome of their discussion. By providing the large flipchart paper, you are able to see more easily when students don't seem to be making progress. Second, by varying the composition of the groups, students won't gravitate only toward their friends or people of similar ability.

I'm trying to expose the students to the idea that statistics is about other issues – do you believe this or that about global warming or second-hand smoke? Once I had the students read a series of

newspaper articles to spark discussion about a particular issue. Rather than lecture, I ran around the room and did “damage control” to keep small group discussions focused. It was hard because the students came up with interpretations and ideas that I never imagined, but it certainly got them thinking. (Statistics)

This type of a task for group discussion can be quite engaging. It draws on students’ prior knowledge and opinions and requires them to apply course content to make a decision or formulate a position. It can be useful to ask each group to report their decision (“Yes, we believe...” or “No, we don’t believe...”) and then continue with a larger group discussion to clarify what conclusions are supported by what they are learning in the course. Research has shown that students are motivated to learn what conclusions other groups draw and to offer an account of their own group’s reasoning.

When groups interact in class, I try to walk around the room before they present their answers and observe the group process to make sure everyone is participating. If not, I ask the quiet folks for their view, and then the group usually incorporates it. (Tepper School of Business)

While small groups make it much easier for everyone to participate and contribute equally, there is still no guarantee that all views will be heard. You may wish to monitor equity and at times challenge those students who may have too much influence or support those who are receiving too little credit. With this type of monitoring, small groups can provide a comfortable environment in which traditionally quieter students (e.g., some women, some students from other cultures, and others) can be active and learn to take risks in large discussions.

When moving around the room and visiting groups, always try to sit or crouch down to the students’ level. I’m 6’4” tall, and it’s very awkward when I tower over people. When you get down to eye-level, you come across less as “checking up” on them and more as another group member trying to work together to solve the problem. (Social and Decision Sciences)

Crouching or kneeling are often the best positions for talking briefly with groups in class. Standing can be intimidating or subtly encourage students to look to you for answers rather than working together. Sitting with the group sometimes makes it difficult to extricate yourself from the discussion to move on to another group.

An Eberly Center seminar on working well with small groups is offered once every year or two. Visit www.cmu.edu/teaching/ for the seminar schedule.

Checklist: Using Group Learning Activities in Class

Planning Issues

- ✓ **Decide how much time you can devote to group work, given the coverage expected in your class.** Brief, informal activities in pairs (often 2-5 minutes) can help students identify questions for further discussion. Longer analytical, problem-solving or interpretation activities (typically 10-15 minutes) give students initial practice and feedback to prepare for complex, outside-of-class assignments.
- ✓ **Consider how groups should be composed in order to achieve the learning goals you have in mind for the students.** For example, the group members might need different academic backgrounds for some tasks and similar interests or goals for others. If so, you may need to help students form appropriate groups.
- ✓ **Write instructions to promote productive interactions within the groups; don't rely on oral instructions alone.** Students need a clear reason to talk to each other instead of working independently. The instructions for the group activity need to provide an organization for the group's discussions such as a few moderately challenging questions or a decision where group members need to reach consensus.
- ✓ **Plan a method of encouraging or ensuring individual accountability within the groups.** You might ask individuals to report (in writing or orally) the group's final product (e.g., a decision, a solution, an interpretation). Sometimes students are motivated by knowing that you will call on someone from each group rather than allow them to choose a spokesperson. Moving around the room and asking questions to "spot check" individuals' understanding helps to keep all students appropriately focused on the task. If you have a large class and can only monitor a few of the groups, consider structuring the task so that the students have some accountability.

Facilitation Issues

- ✓ **Plan a strategy to facilitate, coach, or mediate to improve communication within the groups.** Planning a variety of probing questions specific to the task will help you think fast enough to intervene when you see a problem. To prevent common problems, it is useful to give explicit directions about what constitutes good group communication (e.g., everyone has a chance to contribute, dissenting views are heard).
- ✓ **Be prepared to deal with groups who finish the task before the rest of the class.** Expect students to finish at different rates and have questions ready to discuss with early finishers. Also, don't always wait for everyone to finish. If two-thirds of the class is done and restless, it is usually a good time to discuss the results of the groups' efforts.



Strategies for Difficult Situations

When you are new to a complex lab course

I watched other TAs – how they acted and how they answered questions. Now I'm in my third time and I know what students expect and how to act. (Chemistry)

While you can't become expert at teaching in the lab by observation alone, you can learn a great deal about what kinds of questions and errors are common so that you can be better prepared in the future. Especially if you are in the lab with effective, experienced TAs, you can observe the subtle ways they put students at ease and use questions to engage students in thinking about the material.

Preparation is worthwhile and actually makes your life easier.
(Chemistry)

It is always advantageous to do all of the experiments yourself. Note that some lab courses are organized to give students a great deal of flexibility about how they complete the requirements, thus requiring TAs to be well versed in several different assignments simultaneously. These complex assignments may still be somewhat uncomfortable until you have seen a variety of student difficulties and learned how other TAs helped to resolve them.

In this section, we provide strategies from TAs for TAs for situations like:

- When you are new to a complex lab course
- When some TAs are not prepared for lab
- When there is conflict within groups
- When the grading criteria are defined by others
- When feedback is given to students publicly

When some TAs are not prepared for lab

I have a problem teaching as a team and compensating for TAs who are disinterested or don't have any idea what is going on. Students quickly find out who gives bad advice in lab. The good TAs are inundated and the bad ones sit in the corner. (Chemistry)

Particularly in large courses, lab TAs teach as a team. When some TAs are unprepared, students quickly detect that and go elsewhere for assistance. If a pattern evolves where some TAs become “free riders” and students wait in line for the attention and assistance of an overworked few, you might talk with the instructor or the Eberly Center to address your concerns.

When there is conflict within groups

As a TA, I felt my role was to minimize the pain in the situation as much as possible. I had a duty. For upperclassmen who are thinking about graduate school, I liken the importance of good teamwork to something they will have to deal with later on – dealing with research group members. (Biological Sciences)

Often a TA will play the role of facilitator when groups experience problems, such as one member having too much control or being left out of the process. In some courses, you will have the option of letting students choose to work independently or to move to other groups. If that is not an option, you may want to meet with the students together in order to help them find common goals, understand their differences, and find compromises or detours to get around major conflicts. If you are uncertain of how to conduct such a meeting, you can consult the professor or the Eberly Center for more guidance.

When the grading criteria are defined by others

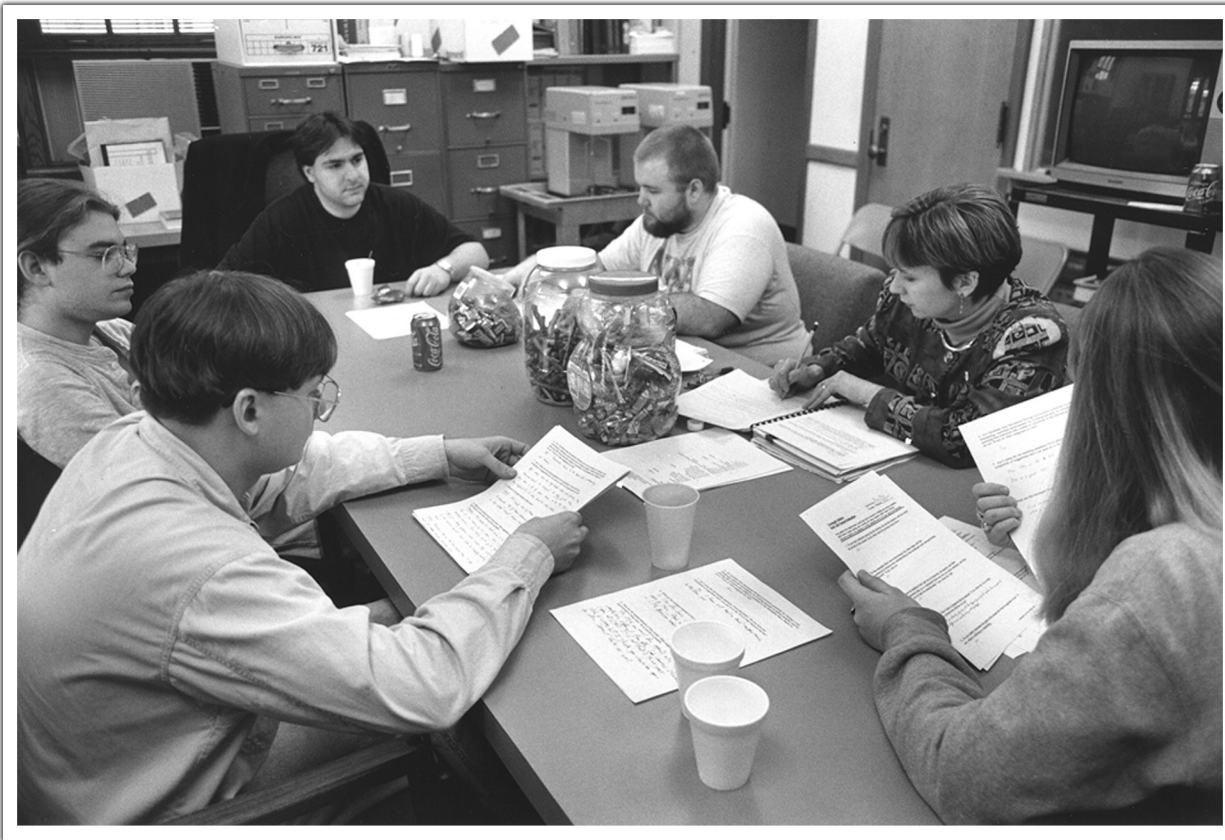
I am a TA for an undergraduate course on software engineering. Students work on projects for real corporate clients. They need to figure out what needs to be done by talking to the client. Leading such groups is very difficult. In such courses, I cannot tell them, “If you do the following things, you will get an A.” (Computer Science)

Group grading always causes some anxiety for students, especially for good students who think they may suffer because of others' disorganization or difficulties. In project courses where success is determined by satisfying the needs of the external client, many instructors try to set some criteria of their own and leave some influence with the clients. As a TA, you can reassure students who are frustrated by this uncertainty both by knowing the grading scheme thoroughly and by helping them to learn to work with clients to clarify and check expectations throughout the project.

When feedback is given to students publicly

My current strategy for critiques in studio is to get up to speed with what students are thinking and what assumptions they're making and then to challenge their current assumptions about design. I like to challenge them, but not be very critical. Generally, critiques should be polite and civilized, but occasional emotion is required to motivate them. You need to communicate excitement to students in your critiques. (Architecture)

Because critiques are often a public form of feedback, civility is a high priority for keeping students open to what you have to say about their work. Harsh critiques may be perceived as personal attacks, and the substantive comments may be too readily dismissed by students.



Grading and Providing Feedback

This section identifies strategies for some of the main challenges graders face in setting grading criteria, increasing consistency, ensuring good communication with the professor and other TAs, and in responding effectively and efficiently to students' writing.

Grading takes time for good reason. When you grade, you often provide the most individualized feedback on students' work that they will receive in courses. The comments you write explain what students are missing and what they can do to improve their learning or performance on future assignments. Even though you may not assign the final grades, you are assessing their work and providing information that students increasingly view as a determinant of their future prospects for jobs and further studies.

When your work in this vital area takes place with very little student contact, it is easy to forget how critical grading is to students' learning and motivation. If you are too harsh, students become discouraged. If you are a "softie," then students may develop low standards and cut back on their efforts. If scores aren't consistent across students or with the instructor's standards, students may perceive the process as arbitrary and not useful for their learning.

This section identifies strategies for some of the main challenges graders face in setting grading criteria, increasing consistency, ensuring good communication with the professor and other TAs, and in responding effectively and efficiently to students' writing.

Setting Standards and Criteria

It's hard to get a sense of what the standards ought to be. In the beginning, I know I was harsh.

History, 10 semesters of teaching experience

It can be hard to know what the standards ought to be because there are so few absolutes in grading. In the beginning, you may gravitate toward standards based on practices in your own undergraduate institution or on your own past performance. However, if you were very successful as an undergraduate, using your own performance as a reference point may make you a harsh grader. While high standards are laudable, you need to calibrate your standards by learning what Carnegie Mellon students can do and by consulting with others about appropriate expectations. Since different professors may have different expectations, you are also responsible for understanding and following their criteria well enough to apply them consistently. How do you calibrate your standards each time you grade? The suggestions below from experienced TAs and the checklist on page 104 provide some strategies.

How do you calibrate your standards each time you grade?

One professor had a great method for exams when I was his TA. When he had the exam drafted, he mailed it to me to get comments on the questions (e.g., are any ambiguous?). Then he made changes and sent it to me again to take. I would take it and that would serve as the key and I would stick faithfully to it. It made grading very smooth. The emphasis on these exams was retention of what they learned in class, so they only got points if they had the ideas that were taught in class, not other answers that seem to "make sense." Then after the exam the professor posted the key. (Tepper School of Business)

Note that some faculty may be reluctant to share drafts of exams if you will be teaching a class or review session in which you might accidentally give away too much information. When you do "pre-test" exams, you may also want to provide the professor with information about the overall length and perceived difficulty of the questions. If you don't have a chance to discuss the exam with the professor early on, it is even more important to seek feedback on your key so that you can address any questions you may have after looking at a few students' performances.

When I grade, I end up changing some of the grades after talking with the instructor because the instructor says, "Well, we didn't explicitly ask them to do it this way." You take off points only if it is explicit because then you can justify it. (Tepper School of Business)

Effective grading requires careful reading of the assignments and not reading much between the lines. Unless you were in class and know that the professor expects certain inferences or interpretations, you should check before including those expectations in your grading key. If you

notice the same deductions occurring on most students' exams or papers, it is often wise to check with the professor before continuing just in case there was a mistake in the assignment.

I did the easy ones first and then pulled out the questionable ones and did those with the faculty member. (Psychology)

Some faculty members prefer to discuss the grading criteria before you begin grading using a key you have made. Other faculty prefer to check your work a day or so before the assignments or exams are to be returned to students. Be sure to check on what method of calibration is preferred for your course.

Increasing Consistency Across Students

Consistency is the major challenge of grading fairly. It is surprisingly easy to forget how many points you gave a similar answer just a few minutes earlier. Fatigue can also cause systematic change in your standards. For example, some people become harsher while others become more lenient as they progress through a stack of papers. Especially if you can't avoid grading when you are very tired, the strategies from TAs on the following pages are essential for maintaining consistency.

For big classes with multiple TAs, I make sure that, rather than divide the exams among TAs, we divide questions among TAs. In other words, each TA grades the same part of all the exams. That way there is greater consistency. (Mechanical Engineering)

Even though it seems much more convenient and faster to give a few exams to each TA, dividing the work question-by-question, when possible, is the single most important step to maintaining consistency.

Sometimes it's a puzzle just to find their error. For each problem, I grade all the ones that are all correct first, then pile the wrong ones according to the type of error. (Civil and Environmental Engineering)

Grading also goes much faster when you can group similar types of errors because it makes it easier to detect the subtle differences between responses. Otherwise, you may have to shift back and forth between different assumptions several times to follow each student's reasoning.

I keep track of how many points I take off for each error. (Chemistry)

The keys grow in complexity as you go. (Biological Sciences)

It is tempting to rely on your memory here, but you will find that searching for a similar answer often takes more of your time than annotating the key or sorting similar errors into piles. Also, if you do not have a good key to refer to, you won't be able to respond effectively if there are grade complaints.

Since I tend to get more strict as I go, I grade lab reports alphabetically, then reverse the order to compensate for changing over time.

(Chemistry)

If you become stricter, be aware that your comments may also become more pointed. When you notice this occurring, it is probably time to take a break from grading.

It's a good idea to use blind grading and ask others what grade they would give one of your student's papers. (Tepper School of Business)

You may be surprised to find that the students who participate regularly in class are not necessarily those with the best written work. Blind grading helps you to avoid subtle bias based on your impressions of individual students during class or in other interactions.

Communication among TAs

In large classes, faculty and TAs often need to develop complex schemes to manage the large amount of grading to be completed. When it is possible, one grader per question or per assignment is the ideal for consistency. However, complex assignments or very large classes can make that impossible, so TAs must take extra precautions to be sure that all students are held to the same standards of performance.

For one professor, we all get together before grading. We grade a couple and go over them with the professor. We develop strategies together. (Heinz School)

Even when you have a detailed key from the professor, students' answers are almost always varied enough to require you to make difficult decisions. Grading a few papers together enables you to discuss those difficult choices and agree on a consistent approach.

In 15-211 [Fundamental Structures of Computer Science I], we have long discussions about grading. One TA is in charge of grading done by the undergraduate graders. Graders first go through the assignments, write comments [for students] and identify errors. After this, they meet. All errors are collected and a rubric is created. The grading criteria are decided. The assignments then go back to the graders, who now assign points. While there is some duplication in this process, it leads to consistent and better comments. (Computer Science)

If there are multiple graders for a single assignment, a good rubric is essential for consistency. A reasonably good rubric can be created with a sample of 5-10 students' work that are carefully selected to represent different levels of performance.

Eberly Center seminars on grading and providing feedback are offered 1-2 times per year. Visit www.cmu.edu/teaching/ for the current schedule.

If different TAs grade different assignments, they need to talk with each other to ensure that the standards don't vary significantly between assignments.

I've heard that for large courses all of the graders sit together with the professor and grade for a few hours. It is like a marathon. They get pizzas. And in six hours and with six people, the task gets done.

(Heinz School)

This method also enables regular consistency checking and good calibration to the professor's standards. It is particularly effective for large classes or for complex assignments that cannot easily be divided into components.

In some courses what people have done is break the semester up and rotate responsibilities such as grading. It helps you plan your time better. We did it switching week by week. It worked pretty well.

(Heinz School)

If different TAs grade different assignments, they need to talk with each other to ensure that the standards don't vary significantly between assignments. Also, students generally need to know who graded each assignment if they are supposed to go back to that person with any questions they may have. If this is the course practice, TAs should sign or initial all papers they grade. However, some instructors prefer anonymity for their graders so that all complaints are handled consistently and so that graders are not pressured to change grades by their peers. Be sure to check on the course policy.

A lot of classes use graders for homework. If you grade your own recitation sections, you get to know how students have understood what you told them. If someone else grades, one option is to at least skim the assignments to get an idea of what they have done.

(Computer Science)

It is valuable to see what the students have done and also to make sure the grader's feedback to the students is clear so that you can answer questions or deal with common areas of confusion.

Clear and Constructive Feedback

Give plenty of feedback when you grade – pointing out good points as well as bad points.

Tepper School of Business, six semesters of teaching experience

Whether you grade essays, computer programs, or problem sets, writing useful comments to students is essential to help students improve their work and stay motivated. Since providing comments is both challenging and potentially time consuming, you need to think carefully about the objectives and criteria for each assignment and relate your comments directly to what students should be learning. Remember that more comments do not necessarily make better grading if students

either don't read them or can't respond to all of them. It is more helpful to focus a student's attention on just a few key areas on which to work. Experienced TAs offer their approaches to writing clear, sufficient, and helpful comments below.

I type a sheet with all the things to be in the assignment and the point structure assigned to it. I do that before the assignment is given out because then the students know these are the points. It is very concrete and students see this before they do the assignment. You see improvement over time, since they get the grading sheet handed back to them with points on it and they try to improve over time.

More concrete criteria and feedback means students are happier.

(Tepper School of Business)

A key prerequisite for this approach is having the grading criteria in advance so that you can relate your feedback directly to the stated criteria. Note that this level of preparation may not be possible the first time a course is taught.

As I grade, I'm interacting with them in my head and writing that down.

(Tepper School of Business)

This method is very useful for helping students to identify unanswered questions and unfulfilled expectations in their work. Take care not to write too many comments because students won't be able to respond to them all and may even be discouraged if they view you as "bleeding all over the paper" with too much red ink.

You have to teach them how to approach problems. In grading you can help guide their thought process. (Chemical Engineering)

While writing solutions for homework shows students effective ways to approach problems, the students may not be able to identify where they went wrong simply by looking at correct solutions. Your comments can be most effective if they help students to see what important cues they missed or misunderstood. If a detailed key is posted or distributed, you can refer to the key as well as write brief comments.

Take every chance to teach students order of magnitude checks.

(Electrical and Computer Engineering)

In many disciplines we would like students to look routinely at whether their answers "make sense" physically given the problem context, but this habit is not easily acquired. You can add comments on errors that may be simply mathematical to help students learn what order of magnitude is plausible in various contexts.

Responding to Student Writing

Writing skill is increasingly important in students' lives both during and after college. In addition to the humanities, social sciences, and business courses—where writing assignments have always been important—courses in many other fields involve substantial writing both to promote learning and to prepare students for the types of writing they will do as professionals. As a TA, you may be involved in responding to students' drafts or grading essays, lab reports, case analyses, memos, or various kinds of projects.

Many faculty and TAs agree that grading and commenting on writing are among the most difficult aspects of teaching. To provide a complete assessment, the reader evaluates both the quality of the ideas and how they are expressed. Problems arise when potentially good ideas are poorly expressed, or when a confusing writing style interferes with serious evaluation of the content. In addition, it is possible to examine writing at many levels, including the argument, overall organization, coherence at the paragraph level, grammar, punctuation, and style. Grading would be an impossible task if comments were required at all of these levels.

A central step toward organizing this type of grading task is having or developing appropriate criteria for each assignment, preferably before the assignment is given to students. If the criteria are stated in advance, students have a better understanding of the expectations and can often meet them more successfully. Clear criteria also focus your efforts as a grader and improve students' learning from your feedback when the comments are linked explicitly to the goals of the assignment. If your responsibilities include grading but not preparing the assignments, you might want to offer to assist with drafting criteria to guide students' efforts. The strategies below and the criteria in the checklist on page 105 should help with the complex tasks of guiding and responding to student writing.

The criteria in the checklist on page 105 should help with the complex tasks of guiding and responding to student writing.

It's useful to have a sheet with criteria so it's clear that students are aware of what you want. But often students don't follow the instructions. (Psychology)

In addition to providing students with a list of criteria about what you want, you also might want to provide them with sample papers as models. The sample papers probably shouldn't be about the same topic as the current assignment, but they should help the students identify the expected type or level of analysis. Another strategy is to provide students with some sample papers that are of varying quality and then discuss what affects quality in each of the sample papers.

Sometimes students might be misguided in how they try to respond to an assignment. Then how do I assign a grade? I tend to reward creative or analytical behavior even if it's not what I've asked for – and I tend to write a “book of comments.” (English)

If you know that the student will not be revising this particular paper, it may be more worthwhile to spend time talking to the student about your expectations for future assignments instead of writing extensive comments on this one. Or, you might focus your efforts on one or two pages (e.g., where you identify specific logical or stylistic problems) and then also provide general comments at the end of the paper. If you observe similar major problems across several students' papers, you might want to discuss these problems and ways to address or correct them in class.

I reward creative skills in a paper. Some students ask if they can do something different – for instance, a painting or an interpretation. Since my major aim is to get people into that creative, analytical thinking, I always say yes. (History)

If you have the leeway to decide what constitutes fulfilling the requirement, be aware of the potential drawbacks of alternate assignments. You may find it difficult to assign grades to projects that vary widely from student to student unless there are at least some criteria that all assignments must meet. Also, if you decide to allow students to do something that is different from the “assigned” task, be sure to make that option available to all students.

Talking to students about grade complaints is difficult to manage. For example, in qualitative assignments, students often have different ideas about what it means to “discuss” something. Sometimes they think it means just using the term. (Tepper School of Business)

You can try to find out from experienced TAs what problems they have seen regularly. Based on their advice and your own ideas, spell out for students where students have had problems in the past, what your expectations are, how much time (or effort) you expect them to put into the assignment, etc. While you cannot know in advance all the kinds of problems that students are likely to experience, you can try to alert them to likely problems.

An Eberly Center seminar on guiding and responding to student writing is offered in alternate years. Further resources are provided on the Eberly Center's web site, www.cmu.edu/teaching/eberlycenter/.

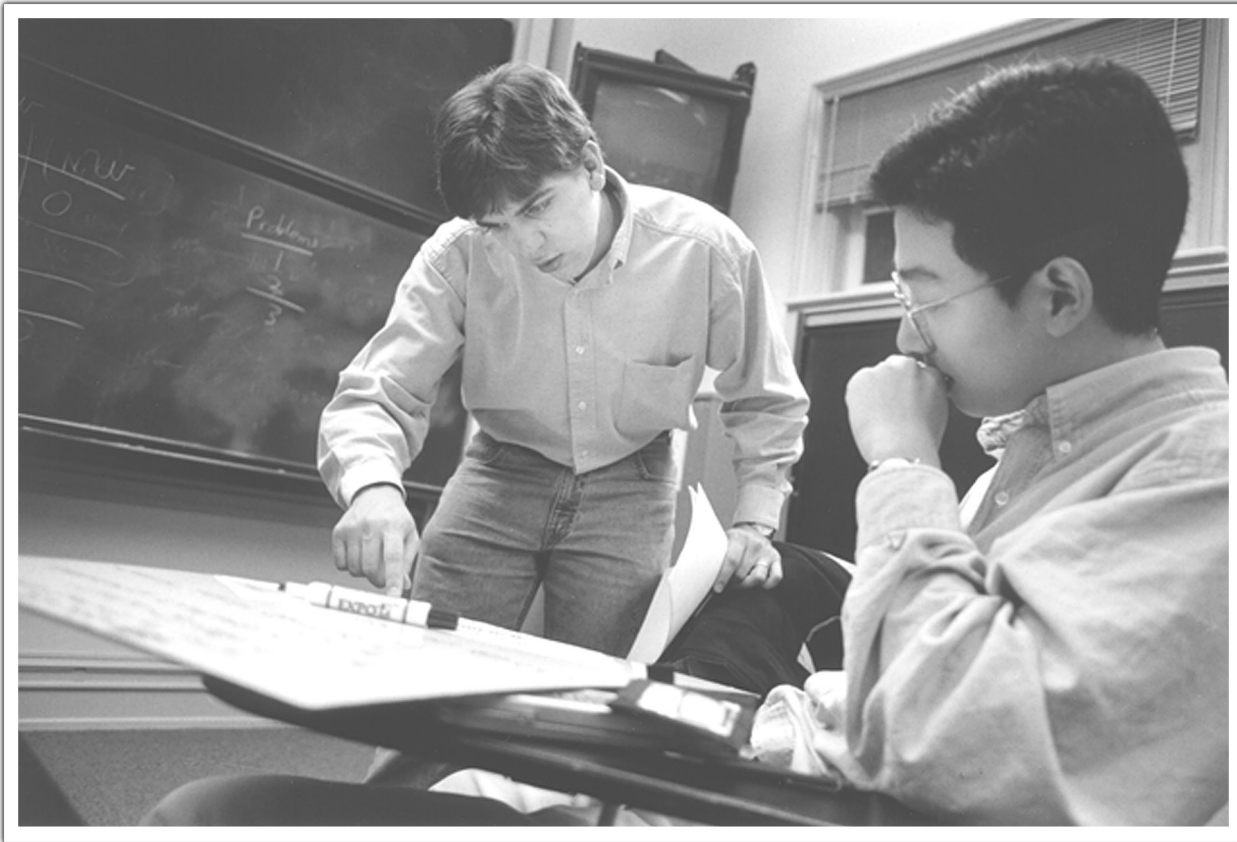
Further resources are provided on the Eberly Center's web site at www.cmu.edu/teaching/.

Checklist: Tips for Effective Grading and Commenting

- ✓ **Create a key and test its adequacy and completeness on a sample of several problems or papers.** Check your system of assigning points, especially partial credit, with the faculty member. If multiple TAs are dividing a set of papers, reports, or computer programs, check that all of the TAs would assign the same grades to a small sample of assignments.
- ✓ **Grade question by question, rather than student by student, for homework and exams.** For essays, you may want to read and comment on each of the introductions before reading all the papers.
- ✓ **Annotate your key and/or refer to previous students' papers to determine how much credit should be given for errors made by more than one student.** Sorting similar errors into piles reduces the time to find comparable papers.
- ✓ **Shuffle the exams or assignments inbetween problems.** Reordering them avoids a pattern of becoming systematically harsher or softer when you get to the bottom of a pile.
- ✓ **Avoid grading when you are extremely tired and have difficulty concentrating.** In addition to the likelihood of inconsistency, most TAs either write fewer comments or more ambiguous ones under these circumstances.
- ✓ **Use unambiguous notations and avoid shorthand or abbreviations in writing your comments.**
If you want to use standard editor's marks on students' writing, make sure they have a reference sheet or handbook that explains the marks.
- ✓ **Comment selectively.** Focus on 2-3 important features of the work related to stated grading criteria and avoid overwhelming the student with more feedback than he or she can respond to all at once.
- ✓ **Provide summary comments.** Especially on papers, lab reports, and projects with complex grading criteria, indicate both what was done well and what could be improved. Whenever possible, note improvement and/or responses to earlier feedback you provided.
- ✓ **Check that the comments are unambiguous.** If you must give substantial negative feedback on a project in which the student is vested, take time to include some encouragement and very concrete suggestions for improvement. Write enough comments to explain significant errors in their work and to justify their overall grade or score.
- ✓ **Examine the overall class performance for patterns.** Especially for exams, tabulate scores on each question to analyze where student performance was weak and/or where questions were ineffective so that you and/or the professor can respond in the future. When you find common error patterns, consider constructing a handout to explain the key concepts.

Checklist: Sample Criteria for Student Papers

- ✓ **Is there a clear thesis?** That is, is there a primary point that the writer is trying to make? Is the primary point easy to identify and understand?
- ✓ **Is the paper written for the appropriate audience?** Or does the writer assume too little (or too much) knowledge on the part of the reader?
- ✓ **Is the paper sufficiently narrow (or sufficiently broad) given the assignment?** Or has the writer selected a topic that is so broad that it cannot be addressed in sufficient depth?
- ✓ **Is the paper logical?** Do the major points from each of the paragraphs contribute to the overall conclusions that the writer draws? For scientific and technical writing, does the writer draw appropriate conclusions from his or her data?
- ✓ **Does the paper have a clear overall structure?** Are there both major and minor arguments being made? Is it easy to see how the arguments fit together? Is the organization suitable for the topic and assignment? If there are disciplinary conventions for the organization of the assignment, does the student follow them?
- ✓ **Does the writer sufficiently consider counterarguments?** That is, does the writer acknowledge major problems with his or her argument and provide rebuttals, where appropriate? Are alternate hypotheses or positions examined sufficiently?
- ✓ **Does the writer provide sufficient background information about the topic?** Depending on the assignment, background may include a problem statement, context to motivate the topic, or relevant history and literature.
- ✓ **Does the writer include a sufficient number of examples?** Does the writer bring in important cases from class readings? Are readings from outside of class used effectively?
- ✓ **Is there sufficient evidence to support the conclusions?** Evidence could include quotations, statistical data, theoretical support, or summaries of related research. If you expect particular types of conclusions, explain this to your students in advance.
- ✓ **Does the writer use an appropriate style and conventions?** Remember that style might identify: whether first person (usually informal) or third person (more formal) should be used, whether technical jargon or layman's terms are more appropriate, and whether most ideas should be cited (and how) or whether it is okay to simply mention the name of the cited author. You may want to consult a style guide from your discipline to glean examples of conventions students should follow.



More Effective Office Hours

This section suggests strategies for one-on-one assistance, preparing effectively for office hours, and increasing your approachability outside of class.

What determines the success of your efforts in office hours? Two key steps toward greater effectiveness are getting students who need assistance to see you and trying to see them when the help will most contribute to learning. Students who have a history of academic success, as many Carnegie Mellon students do, can be reluctant to seek help because they think they shouldn't need it or because they don't recognize signs of academic trouble. These problems are most prevalent among first-year undergraduates, but it is wise to watch for these situations in all courses and develop strategies to manage them.

This section suggests strategies for one-on-one assistance, preparing effectively for office hours, and increasing your approachability outside of class. A checklist is provided on page 111 to offer assistance in getting students to see you in a timely way.

Helping by Coaching

What is the line between telling students what to do and how to do it?

Civil and Environmental Engineering, first-time TA

Office hours often involve meetings with students who are hoping you can get them “unstuck” on the assignments. At first, you might give concise explanations to fill in gaps in understanding from lectures or the text. To help you avoid telling students exactly what to do (especially when the question is about a graded assignment), it can be useful to view yourself as a coach more than as a tutor. In this view, your primary purpose is to give students feedback about what they have done so far and offer direction for further work. But in order to know what kind of feedback and direction they need, you usually need to see an example of students’ written work or reasoning. Since students often have trouble with getting started, you may need additional strategies to determine what they need from you.

You can encourage them to show you or explain to you what is causing them difficulty in a variety of ways. For example, you can look at their work-in-progress. Instead of trying to answer their questions directly, you might find or create illustrative examples for them to solve or analyze while you help. In this way, you can see and hear their reasoning and ask questions about their strategies and decisions. Here are some of the ways experienced TAs start their conversations with students and avoid “giving away” hints or direct steps toward completing an assignment.

I try to get them to ask specific questions. (Heinz School)

When students can’t articulate what they don’t understand, you can ask them to go back to their notes and identify where they may have gotten lost.

Generally, I ask students leading questions. (Mechanical Engineering)

Good leading questions help students to notice the most relevant and important features of a problem. If you are concerned about giving too much information away, leading questions may be helpful to direct students’ attention to material they need to re-read in the text or their notes.

I think that students just don’t know where to begin with their questions. The key to being a TA is catalyzing the questioning process. Sometimes they just sit there. You have to ask, “Do you understand this, or this?” (Biological Sciences)

By listening carefully, patiently, and respectfully, a TA can gain insight into the particular misconceptions a student may have.

It is particularly difficult to help students who come to you because they don't know where to start. When this happens, you may want to ask the student to solve a problem or explain a concept to you. If you can back up enough to find material the student understands well, then you can use that as a foundation to build on.

It's one thing to solve the problem yourself but quite another to know how the students approach the problem. It's not at all obvious. It takes longer to figure out how they approached it than it does just to show them the right way, especially if you are just barely figuring it out for yourself. It can be very difficult especially if they are from a different major and may approach things differently. (Biological Sciences)

To understand a student's approach, you need to listen very carefully to his or her description of what they tried. Ask questions about how they decided what to do at each step to elicit strategy information and underlying knowledge.

I work to make sure that all students meet with me in my office. My most important role during tutoring, besides providing help with the course material, is treating the student with respect, listening, and observing carefully how problems are approached.

(Physics, faculty member)

By listening carefully, patiently, and respectfully, a TA can gain insight into the particular misconceptions a student may have. It may take several minutes of watching the student work and observing his or her strategies in order to see what kind of help is needed.

Preparation Advice

If your teaching assignment includes grading and office hours but not recitations or review sessions, you may find it tempting to prepare less and to rely on your general discipline knowledge to answer questions or solve the problems when you need to. Experienced TAs suggest that significant preparation is essential, especially if you are answering questions about homework assignments.

You have to know material twice as well as the undergraduates. They will come up with difficult questions. You can't just know the material on a surface level. You have to put the time in to understand the material. (Chemical Engineering)

For office hours and for recitations, know the homework backwards and forwards. Work through the exam ahead of time if you are proctoring and anticipate clarification questions. (Heinz School)

If you are responsible for grading and writing solution sets, it can be very helpful to work the problems far enough in advance so that this process serves as preparation for office hours.

You need to know how the professor approaches a particular topic. For example, in one course, the professor said that the students had to use a free body diagram in their solutions. If they did not, I was to deduct 50%. It is important that, as a TA, I am able to convey these expectations up front to the students. (Mechanical Engineering)

Many TAs who hold office hours also hold review sessions. In both situations, TAs need to know what the professor expects of students. For more about review sessions, see pages 54-55.

Being Accessible and Approachable

Students are at both ends of the continuum. Some don't feel they have a right to see me. Others park themselves in my office to get the answers. And there are some students everywhere inbetween.

Engineering and Public Policy, two semesters as a TA

Some TAs are incredibly busy in their office hours, while others wish that more students would come for help. Ideally, a TA should be approachable enough that students who are struggling with the material and those who are very interested in it will feel comfortable asking their questions. Part of accessibility is being visible (in class or by attending some lectures if you are a grader) and being friendly so that students realize you really do want to help them. In courses where you don't see students in sections or labs, instructors can facilitate use of office hours by reminding students about your availability. Following are more specific strategies for increasing your accessibility, offered by experienced recitation TAs, graders, and faculty.

I have had no difficulty in getting people to come to my office hours. I'm not sure why. One reason could be that in class I often refer to what came up during the office hours. (Computer Science)

Letting students know that office hours are used by others and that you are happy to have them there can reduce barriers for shy or struggling students.

Students never come and ask me questions. However, when I walk past the cluster and ask them what they are doing, they ask me a thousand questions. (Civil and Environmental Engineering)

Being available when students are in the midst of an assignment makes it easier for them to ask small but potentially important questions. Especially for programming or project work where students may not be able to show you their work in your office, it can be useful to hold some "office hours" where the students are working (e.g., computer clusters).

I have cut down on structured TA hours and made myself more available.
(Heinz School)

For mature students who aren't reluctant to seek assistance, flexible hours can work well. Decide whether you are comfortable allowing students to call or walk in any time though. Many people find it helpful to explain the limits of their availability (e.g., "Feel free to call me until 9 p.m. or to stop by any time my office door is open"). If someone catches you when you are very busy with other work, it is fine to defer talking and set up an appointment for another time.

I've had a number of students come in during my office hours. It has to do partly with the subject. Also, sometimes the instructor tells students that they should talk to me or points me out in lectures. Whenever that happens, I have more than twice the students coming in to my office.
(Mechanical Engineering)

Often after a major exam I talk in depth with students who did poorly on the exam. It takes an hour to an hour-and-a-half to do a careful critique and to attempt a diagnosis of the problem.
(Physics, faculty member)

Some instructors use their diagnosis to refer students to work with the TA. Others ask the TA to attend a shorter "diagnosis" meeting and jointly make follow-up plans to help the student. Invitations like these can help to get students who are having significant difficulties to seek your assistance in office hours rather than fall further behind.

Checklist: Getting Students to Your Office Hours

Early in the course

- ✓ As much as possible, schedule your office hours at times when students are available. Check with students to be sure that they can attend. Show that you are willing to schedule appointments at other times as needed.
- ✓ Invite or require students to come to your office, alone or in small groups, for a very short introductory chat at the beginning of the course. This step may be especially helpful for first-year undergraduates who don't know what to expect from a TA.

Throughout the course

- ✓ Make yourself available to students immediately before and after class to answer quick questions and set up appointments. If possible, attend at least some of the lectures for the same purpose.
- ✓ In class, mention interesting topics of discussion that have been or can be continued in office hours. Such examples show that office hours are not just for getting help when students are stuck.
- ✓ Both before class and in office hours, welcome conversation about topics other than the course material and make small talk with students to put them at ease.
- ✓ Remind students regularly about your office hours. Some TAs write them on the board in each class, especially for first-year undergraduates.

For students who particularly need help

- ✓ Invite students to your office via e-mail or in person when something about their performance or behavior causes you concern. If a student is having significant difficulties and may not want to acknowledge the problem, you may want to contact him or her both in writing and in person. Speaking in person allows you to convey your concern for the student more accurately than e-mail.
- ✓ Discuss with the professor whether he or she might refer students to your office hours after low grades on quizzes, papers, or exams.



Strategies for Difficult Situations

Sometimes students look at a friend's paper and want to know why they didn't get a better grade.

Tepper School of Business, seven semesters as a TA

A major issue in improving grading is increasing the clarity of our expectations of students.

When students request regrades

One professor I worked with has a 3- to 4-day complaint period that he clearly announces to students. They know they can bring complaints to me during that time. (Tepper School of Business)

My professor has a policy for students to submit a memo for regrades. This gives me a buffer zone. (Civil and Environmental Engineering)

Since students asking for regrades are often angry or upset, it is valuable to have a policy that gets students to think carefully about the grading criteria first and get past their initial emotional reactions before they talk with a TA or professor.

It goes smoothly when the regrades go to one person. (Chemistry)

If students are given a clear policy about whether a TA or the professor handles regrades, students will be discouraged from seeking the "softest"

person. If they are supposed to go to someone other than the grader with questions or complaints, the grader needs to provide clear information, such as a thoroughly annotated key, to that person to assist them in answering questions.

The worst thing that happened to me was when I did the grading and was responsible for deciding how to do it. The professor completely did not back me up with the students. I should have negotiated my authority up front. (Heinz School)

Be sure to clarify how regrade requests will be handled if you are responsible for making the key and grading students' papers. Even though the task may take some time, you may want to ask for the responsibility for handling these requests to maintain consistency across students.

When an anonymous grader's name is revealed

Mostly, the grading is done anonymously, but last term someone gave out the names of the graders for a particular homework. I wasn't comfortable being put into the position of justifying grades to students when I wasn't designing the rubrics or criteria for the grading. (Computer Science, undergraduate TA)

If the course policy is for someone other than you to handle grading questions and complaints, be sure to refer students to that person, even under these circumstances. You can emphasize to the student that it is important to maintain consistency in consideration of regrades, so it is your responsibility to defer questions to the designated person to avoid sending any mixed messages.

When you have to deal with possible academic dishonesty

I remember one thing from TA training – be sure to draw a line through blank spots on assignments so students don't fill them in later and ask for more points. (Social and Decision Sciences)

We're seeing more and more problems with fraternity paper banks and online paper sources. I try to give students assignments and books to analyze that I'm pretty sure nobody else is reading. (English)

One implication of this problem is that TAs and instructors need to be creative in their assignments so that it will be easy to detect when a student is trying to force-fit another person's work to the assignment. You can often discourage this type of plagiarism by requiring students to submit their work-in-progress for feedback. If an assignment is "recycled" from a previous year, you need to be more vigilant about noticing suspicious signs such as when a student's work has improved significantly all at once or when their writing style has changed suddenly.

We have cheating detection programs. CS students don't cheat more. It is just that they are found out more. You need to make sure that the automatic cheating detection program is used early on in the course. (Computer Science)

Early detection of cheating is most useful if all of the students know that the TAs and instructor have found a problem and are actively working to prevent further incidences. Without violating students' privacy rights, you can tell the class that you found a suspected instance of cheating and how you handle such cases. When we say nothing, some students assume we don't notice or don't care about academic dishonesty. For more about the university policy and procedures on academic integrity, see pages 136-137.

When you don't agree with the professor's criteria

I have a difficult time with grading because I don't always agree with the key from the instructor or the breakdown of the points. But I am still a representative of the class. I have to defend things I don't agree with. (Chemistry)

Grading philosophies can vary quite substantially. If you find that you and a professor disagree, do your best to understand the principles behind his or her standards. Ask enough questions about the rationale so that you can adequately explain the grading scheme to students. You may not agree with this particular instructor now, but you may be able to learn about methods useful for other contexts you may teach in someday. In the short term, you shouldn't let students know you disagree with the professor because it can undermine his or her relationship with students and create a bad dynamic between you and the instructor.

As a TA, you can talk with the professor about providing models of excellent student work or about ways you can help students produce clearer work. See pages 102-105 for ideas about how to do this for writing assignments.

When students' work is ambiguous or incomplete

It is hard to tell the difference between algebraic and conceptual errors especially when students skip steps or don't start from the beginning. In physics, signs usually indicate direction and it can be difficult to judge whether it was a conceptual problem or just a simple math error. (Physics)

A major issue in improving grading is increasing the clarity of our expectations of students. As a TA, you can talk with the professor about providing models of excellent student work or about ways you can help students produce clearer work. See pages 102-105 for ideas about how to do this for writing assignments.

When an unprepared student comes to office hours

If homework is due the next day, some students will stick around because they can't go off to work on it themselves. The real problem is that they haven't started the homework early enough.

Mechanical Engineering, four semesters as a TA

When students start doing the homework in my office, I tell them I will be back in 20 minutes. That way they will have to do the homework on their own for a while. (Civil and Environmental Engineering)

I question them to see if they are on the right track, for example, "Where do you think that you should start?" Ask questions and urge them to go with their thoughts. (Civil and Environmental Engineering)

Sometimes students come unprepared because they lack the confidence to get started on their own. Approaching them with process-oriented questions can help them to realize that they know more than they realize.

When some students seem to take advantage of you in office hours

How can you be fair to everybody and be fair to yourself in terms of time and effort? If you really help them out you are called a doormat and if you don't you are a bad TA, so what's the balance?

Heinz School, two semesters as a TA

I make sure that I have no office hours just before an assignment is due. (Computer Science)

Since many students wait until the last minute to do their work, they like you to be available when they are doing the work. While evening office hours are very helpful and convenient for students, you do not need to hold office hours on the night before an assignment is due if students flood your office looking for shortcuts and quick answers that do not promote learning. Just let them know when you will and won't be available so that they can plan accordingly.

You should not be afraid of saying that the office hours are over. (Mechanical Engineering)

If you have a strong commitment to teaching and want to welcome students in your office more than just during office hours, an “open door” policy can build great teacher-student interaction. But it has some costs when a few students want to spend a great deal of time with you just chatting. In the interest of your own efficiency, you may sometimes need to set limits. For students who want extensive support from you, you may need to start your meetings with them by stating that you have until a certain time and then you have another commitment.

Many students expect you to spoon-feed them. You need to tell them that they are there to learn as much as you are there to teach. There is always this tension about how much you can tell them. My solution to this problem is to never give students the answers but to ask questions.
(Computer Science)



Benefits of Being a TA

Demands for teaching excellence have increased nationally and have made the TA experience increasingly valuable as a professional development opportunity.

In the not-too-distant past, TA positions were viewed mainly as a means of financial support during graduate school. However, in the last several years, demands for teaching excellence have increased nationally and have made the TA experience increasingly valuable as a professional development opportunity. Among the long-term benefits are the following:

- In a competitive academic job market, many institutions are looking for successful teaching experience as a credential for faculty positions. For teaching-oriented institutions, substantial teaching experience and evidence of effectiveness are major factors in hiring decisions.
- Alumni with careers in industry or government have reported that their teaching experience is very valuable in their work; some would have liked even more teaching experience in graduate school. Through teaching, you can enhance your presentation skills, improve your organizational abilities, and develop the ability to lead and supervise others in a variety of contexts.
- Working as a TA in a variety of courses introduces you to varied approaches to teaching material in your field and helps you develop relationships with potential faculty mentors. If you plan

to pursue a faculty career, the breadth of teaching models and collections of sample course materials can also significantly ease the transition during your first year of teaching on your own.

- Successful teaching is sometimes viewed as evidence of fluency in English for nonnative speakers who are seeking professional positions in the U.S.

Of course, TA responsibilities also provide their own intrinsic rewards of interacting with talented, enthusiastic students across disciplines. Many people discover how much they enjoy teaching because of their TA experience. Some find it easy to devote time to teaching because of the satisfaction they get from seeing students learn and develop. The following sections are designed to help you continue to improve as a teacher and to be efficient while also being successful in your other responsibilities.

Increasing Your Efficiency

A challenge is how to fit teaching into my schedule as a graduate student.

History, three semesters as a TA

Working as a TA – like being a professor – involves juggling multiple tasks: doing good research, teaching effectively, and satisfying other departmental requirements such as your own course work. The difficulty of this juggling will depend on your own efficiency and others' expectations. Some TA assignments are more demanding due to the class size, the level of the students, or your role in supporting students' learning. Some semesters, especially in your first and last years as a graduate student, require you to find time for teaching in addition to demanding course projects or research of your own. Since faculty expectations vary about the best ways to manage your multiple responsibilities, it helps to be able to maximize your efficiency and adapt to different demands. This section addresses conflicts you may experience in making time for teaching, strategies for saving time where you can, and ideas for adapting to the different approaches faculty take to working with TAs.

Dealing with Tensions

Perspectives on handling tensions with advisors or students vary greatly from one TA to another. How you handle them depends on your long-term goals, the nature of your relationship with your advisor, and what you believe your students need from you as a TA. The experiences of a few experienced TAs, described below, show common concerns that clearly suggest that a good TA also has to be efficient in order to be a successful graduate student. If you don't think you are being as efficient as possible, the checklist on page 124 can help you monitor where you may be able to save time teaching without compromising your effectiveness.

The Eberly Center offers support to assist graduate students in developing and documenting their teaching effectiveness and in preparing for the teaching component of a faculty career. Further information is provided on pages 132-133 and at www.cmu.edu/teaching/.

If you are disciplined about the ways in which you devote time to teaching (e.g., holding reasonable but not extensive office hours) and still have difficulties fulfilling your responsibilities, you may want to consult other graduate students, your department's graduate advisor, or the Eberly Center to identify strategies for coping with the conflicts.

I enjoy being a TA. I am attached to it. At the same time, however, I am trying to finish my thesis. My advisor keeps beating down on me. Getting the balance is difficult. (Computer Science)

Sometimes advisors lose perspective on your career goals and may downplay the importance of your teaching. If you are nearing completion of your degree and plan to pursue faculty positions with a substantial teaching component, you may want to remind your advisor that demonstrating strong skills in this area is important to achieve your professional goals. However, if you have had substantial teaching opportunities prior to the thesis stage, it may be in your best long-term interest to focus on teaching as efficiently as possible in order to complete your degree in a timely way.

Some advisors don't want you to take time to prepare to teach. Some people go elsewhere, away from the lab, to spend time grading or preparing. (Chemistry)

My advisor had a different view about my being a TA. He made it clear that any time that I spend as a TA had to come out of my personal time and that I could not take it out of my research time. (Computer Science)

Sometimes advisors worry that, if working with students gives you an immediate satisfaction that research may not, spending extra time on teaching can become a way of avoiding certain difficult research tasks. You need to know the number of hours your department expects of TAs in order to decide whether you want to discuss the issue with your advisor, the professor for the course you TA, or someone else. If you are disciplined about the ways in which you devote time to teaching (e.g., holding reasonable but not extensive office hours) and still have difficulties fulfilling your responsibilities, you may want to consult other graduate students, your department's graduate advisor, or the Eberly Center to identify strategies for coping with the conflicts.

On at least two occasions I've had students want to meet with me [outside of my office hours] when other TAs had scheduled office hours. In a way you are flattered, but on the other hand, it's annoying. (Heinz School)

If you are a good TA, everyone comes to your office hours. And if you are not such a good TA, you finish your dissertation. (Heinz School)

Being popular with students is both rewarding and complicated. When you are part of a team of TAs for a course, some students may prefer your style of explanation and seek your help. They may approach you when you have other commitments and deadlines. At times, you may recognize that a student truly needs your help. However, to protect your time for course work and research, you also need to be willing to set limits about your availability. For example, sometimes you can reasonably send students to

other TAs, especially when their office hours fit the student's schedule, or schedule an appointment in the very near future when you can give more attention to the student's needs.

Time savers

No one told me that grading takes three times as long as you think it will.

Civil and Environmental Engineering, three semesters as a TA

Teaching is particularly time-consuming for the first few semesters because you are learning about the students, developing new plans for each class, and grading assignments for the first time. If you are planning to pursue a faculty career, you might look at your TA experience as a way to collect useful, time-saving materials for your own courses later. Of course, you also want to save time now to meet all of your current goals successfully. One popular strategy is to request the same course every time because you save preparation time, and grading time often decreases with practice. TAs who are looking ahead to teaching in the future may want to gain experience in different courses they might teach, so drawing on others' prior experience and materials can be a valuable way of saving time. Depending on your department's needs and your own professional goals, you may need to strike a balance between these approaches. Next are some specific strategies that TAs have found helpful and efficient in their experience.

At first, I spent one hour gathering information plus six hours to prepare for class. Now I just review my notes from previous semesters. (History)

How can you organize your notes to make this possible? Include detailed references, with page numbers, for extra sources or texts. Keep photocopies of excerpts from hard-to-find sources. Annotate your notes as soon as possible to indicate ideas for changes right after you teach the material each time.

Set office hours. I found my time more well spent when I didn't have to rearrange my time every week to see students. I no longer get eight students over eight hours. I will help one student and, as the other students are waiting, they will start working together on a problem. By the time I'm finished with one student, they are practically done. (Physics)

You may want to be more flexible during the weeks when students are preparing for major exams and assignments.

Write out solution sets. This saves time by giving me an option when a student has a question. I can give them the solution and ask them to go through it alone to see if that answers their question. It makes my time usage very efficient. It also organizes my thoughts. If nothing else, check the solutions manual. (Physics)

Good solution sets, with some explanation of key decision points and important inferences or assumptions, can answer questions for many students and can improve the quality of discussion you have with students in your office. However, even with explicit solution sets, you should still be prepared to explain the problems in office hours if needed.

I had prior contact with the former TAs. It really helped. I had two TAs in the department who could help and others who were available by e-mail. (Psychology)

Utilize course notes, homework, and exams from previous instructors as a guide to appropriate level of difficulty and content. (Tepper School of Business)

Some departments maintain files to facilitate this kind of building on past experience. Inquire about what is readily available in your department and about who might have good materials he or she might share with you. Note that you often have the opportunity to adapt these materials so you may be able to improve on them and still efficiently prepare to teach. In any case, be sure to allow enough time to know the materials thoroughly.

If you rotate responsibilities with other TAs, scheduling your grading at the beginning of the semester can be helpful. (Civil and Environmental Engineering)

Especially if you are taking demanding courses yourself, you may want to do the bulk of your grading before your own project deadlines compete for your time.

I keep extra copies of quizzes and use them for the review. It's efficient because it's in the professor's language and emphasizes what they want. (Chemistry)

It helps to keep a record over time of where students tend to make mistakes. Then you can emphasize those things the next semester. (English)

Some faculty members ask their TAs to tabulate types of errors for exams in order to find the areas where many students tend to have difficulties. Saving and sharing sample papers is also a great way to help future students learn from past students.

Adapting to Different Faculty Styles

Throughout this booklet we have emphasized that different TA assignments can have very different responsibilities. The variation is due in part to differences among faculty work styles. In many departments, you will work as a TA for enough different people to benefit from a variety of models, but adapting to others' styles efficiently means some extra planning on your part.

Strive to understand your instructor's work habits. You can ask older Ph.D. students for tips. They'll give you ideas for working well with that particular instructor. (Tepper School of Business)

Refer to pages 10-11 for ideas about questions you may want to ask of fellow students as well as the professor.

Working with professors who were well prepared was very helpful – they were good role models. But as a graduate student, you can't demand too much from a professor. I did this at one point and the professor snapped back at me. You can go too far the other way and let things crumble, too. It depends on how much control and responsibility you're willing and able to take in the situation. (Social and Decision Sciences)

If you see more tasks that need to be done than you think you can or should do, you should consult more experienced students (and possibly your advisor, the Eberly Center, or other mentors) to determine how best to work with the professor and allocate your time. Sometimes other faculty in your department can assist you in conveying feedback to the professor if there are problems in the course. In the long run, you can't give so much to a course that you sacrifice significant progress toward your own goals. In the short run, you must decide what you need to do to adequately support students' learning in the course.

I had to deal with a professor who was a control freak. He wouldn't tell us what he was doing in class but wanted to know everything that we were doing. In spite of everything, we always had to pretend to like him in front of the students. Part of the role of teaching that's sometimes hard is always giving the impression that you like all of your colleagues. (Mathematical Sciences, undergraduate TA)

Even when you and the professor are not communicating well, it is essential not to undermine the professor's authority. Avoid confiding in students about any difficulties between the TAs and the professor. If you think communication problems are affecting the quality of the course, you might be able to report students' concerns to the professor in a way that opens a discussion about ways to improve the situation. Note that any such discussion should respect the professor's authority and time constraints, for example, "Several students seem concerned that I don't know enough about what you are covering in lecture and I seem to be repeating the lecture too much. Could we talk about whether there are ways I could be more informed about the lectures without making extra work for you? Maybe I could attend lectures or the TAs could rotate attending and share their notes."

In the long run, you can't give so much to a course that you sacrifice significant progress toward your own goals. In the short run, you must decide what you need to do to adequately support students' learning in the course.

Checklist: Where Might You Save Time on Teaching?

- ✓ **Finding and developing ways to use examples for class.**
Be sure to clarify your objectives before you begin to search through many sources. Try to read selectively for what you need.
- ✓ **Grading.**
Monitor your average time per question or paper so that you stay focused on the key criteria and are undistracted by relatively unimportant details. Notice if background noise or interruptions where you are working are slowing you down. If you are spending a lot of time writing comments on similar errors, consider making a short handout explaining the common errors instead. Finally, using scales to grade writing can be a time saver; more information on scales is available on request from the Eberly Center.
- ✓ **Preparing and doing homework.**
Making a detailed solution set can be a good way to prepare for class and/or office hours. If students are not required to turn in homework in your course or if someone else creates the grading key, choose a representative sample of problems to work in preparation for answering students' questions.
- ✓ **Creating assignments, quizzes, or potential exam questions.**
Look for available samples from past semesters to help you calibrate length and difficulty. Talk with experienced faculty and TAs to get feedback on your drafts. Always check the clarity of your questions or problems by answering them yourself and making sure the answer follows clearly from the question. If you check the clarity up front, you save a great deal of time later explaining ambiguities or handling grade disputes.
- ✓ **One-on-one conferences with students.**
If you are getting many questions on the same issues, consider posting an explanation to the course Blackboard page or holding a help session. Also, notice when meetings do not have a clear purpose and decide if you can shorten or direct the conversation more (e.g., when certain students simply want to chat with you too often or come to ask questions before trying an assignment themselves). See strategies on page 115 for when an unprepared student comes to office hours.
- ✓ **Working on the course web page.**
Discuss with the faculty member other ways to distribute information to students if the course Blackboard page becomes too time-consuming to maintain and isn't widely used.
- ✓ **Meeting with groups who are having problems with projects or conflicts with each other.**
Talk with the professor about whether some class time might be devoted to discussing common problems on the projects or strategies for improving group communication.



Enhancing Your Teaching

Throughout our conversations with TAs, one piece of advice was repeated more than any other: Talk with experienced TAs. For course-specific or department-specific questions, this advice is excellent; peer support networks are strong in many departments where teaching is a common activity among graduate students and where courses traditionally have regular TA meetings. But what do you do after you become one of those experienced TAs and still want to continue improving your teaching or prepare for an academic career? You can find a variety of types of assistance from peers and faculty, through feedback from students and by taking advantage of support offered through the Eberly Center described in the checklist on pages 128-129.

What do you do after you become an experienced TA and still want to continue improving your teaching or prepare for an academic career?

Seeking Models and Mentors

If there were 10 booklets like this one, I'd still want a person with similar background to talk with.

Mathematical Sciences, first-time TA

Many people believe that you can learn to teach effectively by simply knowing your subject matter and doing what others have done before you. Of course, merely observing faculty members does produce

some learning, but you can greatly accelerate the learning process and substantially improve upon it by actively seeking teaching information and mentoring from faculty, as these experienced TAs describe.

Negotiate with the person you are TAing for. Let him or her know what you want from the TA experience. And, of course, learn what they expect. Think of it as a partnership. (Heinz School)

To develop a good working relationship with a professor, you may want to let him or her know what kinds of experience you already have and what kinds of opportunities you'd really like to have, if possible. This conversation may help you to find a teaching mentor who will help you get the opportunities to practice new skills and be able to help you work toward your goals.

My advisor was the professor for a class I TAed for. It was good for me to be involved in the whole process. It took a lot of time, but I considered it "professor training." (Mechanical Engineering)

Going to another instructor's class is a good way to learn to be more facilitator and less lecturer. Having good models is the best way to learn. (Psychology)

If you are sitting in on the lectures to help you prepare for recitation or lab and don't need to take a lot of notes for that purpose, you might want to take notes about how the material is taught instead of what is taught. How does the professor keep students engaged? Which examples seem to be most effective? What does he or she do to make the class interactive? These kinds of notes can be very helpful to you in planning your own courses as a new faculty member. Also, if you haven't had a chance to TA for a professor who would be a good model for you, consider asking him or her if you can sit in on a couple of classes. Faculty often welcome the chance to be a mentor and may have time to discuss their teaching methods and philosophy with you.

The checklist on pages 128-129 provides an overview of the support available to TAs and graduate student instructors.

Finding Your Own Style

There are many different ways to be an effective teacher. The guidelines in this booklet provide a good start, but you undoubtedly want to find your own way of implementing these ideas. As you explore different methods, be sure to keep in mind ways you can assess what works best for you and your students. Sometimes faculty arrange to visit or videotape their TAs so that they can offer their feedback and suggestions. Several types of information can be useful in enhancing your teaching and developing a style that's comfortable and effective for you. Each is described in more detail in the checklist on pages 128-129, which provides an overview of the support available to TAs and graduate student instructors.

- Student evaluations, especially those early in a course, give you information about improving classroom interactions, grading, or assignments. Sample evaluation forms are available on the Center's website.
- You can contact the Center to arrange for your class to be videotaped if you want to see yourself through others' eyes.
- It can be helpful to get an additional perspective from an experienced teacher. The Center can arrange for a peer observer for your class. Or, if you would like someone in your department to give you feedback, categories to consider in observing classes or reviewing videotapes are also available on the Center's website.
- If you have the opportunity to teach a class on your own, it is useful to discuss your course plan and syllabus with someone before the course begins. You can contact the Center for consultations at any stage in the course planning process.

As you develop your own style, consider the perspectives of these two experienced TAs.

Use your personality to your advantage – be yourself. (History)

In the short run, being yourself matters because it builds a more honest and comfortable relationship with students than if you have to act or play a role in class. In the long run, it matters because most academics spend large amounts of time with students and you want to do so comfortably. As a TA, you can begin to develop a teaching style that is both comfortable and effective.

Teaching is a learning experience – experiment and go with what works for you. (Heinz School)

Trying different approaches is an excellent idea, but it is important to keep the experiments small at first. For example, if you want to learn to lead discussions in a technical course, start with a 10- to 15-minute discussion rather than a whole 50-minute class. Also, be sure to assess, at least informally, how well the new methods work by chatting with students afterwards or asking them to write something brief about what they learned from it. For more about classroom assessment techniques, contact the Eberly Center.

Teaching, like writing or problem-solving, is a complex intellectual skill that develops gradually with experience and feedback on what works. The Eberly Center can help you with planning and assessing new ideas you want to try and by working with you as you reflect on your teaching as a whole.

Trying different approaches is an excellent idea, but it is important to keep the experiments small at first.

The Eberly Center can help you with planning and assessing new ideas you want to try and by working with you as you reflect on your teaching as a whole.

Checklist: Support for TAs and Future Faculty

Offered by the Eberly Center for Teaching Excellence

- ✓ **Seminars on teaching for TAs and future faculty.**

Approximately 20-25 interactive seminars are offered year-round on core topics such as conducting discussions and designing courses as well as on special topics such as working well with small groups or grading student writing. Most seminars last 90 minutes to 2 hours. To allow broad, active participation, enrollment is limited to 20 participants per session.
- ✓ **Peer observations and feedback by Teaching Fellows.**

Graduate student Teaching Fellows, who are experienced and effective TAs themselves, are trained to provide individualized, helpful feedback on teaching. Since they have a broad range of academic backgrounds, they can often address discipline-specific concerns you may have. Formal, confidential written feedback is provided with each classroom observation. You may want to use this feedback memo in documenting your teaching effectiveness in the future.
- ✓ **Videotaping and review.**

If you are curious about how you come across as a teacher, you can contact the Center to arrange to be videotaped in class. You can review this video on your own or with Center staff.
- ✓ **Microteaching workshops.**

One option to get feedback on your teaching is to sign up for a microteaching workshop in which you can teach a very brief (5- to 7-minute) lesson to a group of peers and later review it on videotape. Because these workshops involve substantial discussion and reflection, microteaching workshops are useful for seeing how others approach teaching and beginning to clarify your approach and philosophy in preparation for an academic job search. These workshops are offered several times a year.
- ✓ **Consultations on early or final student evaluations.**

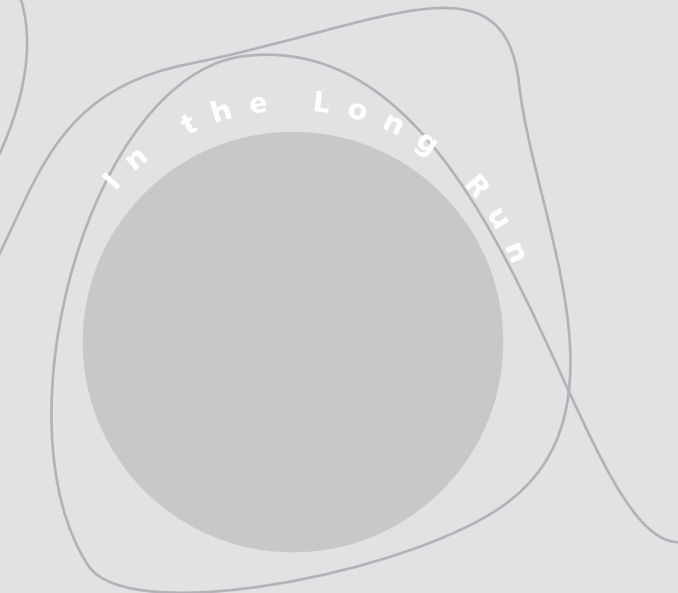
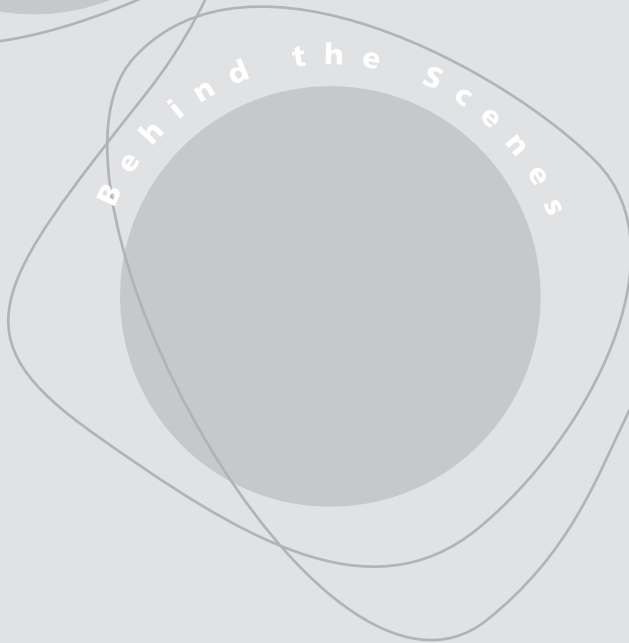
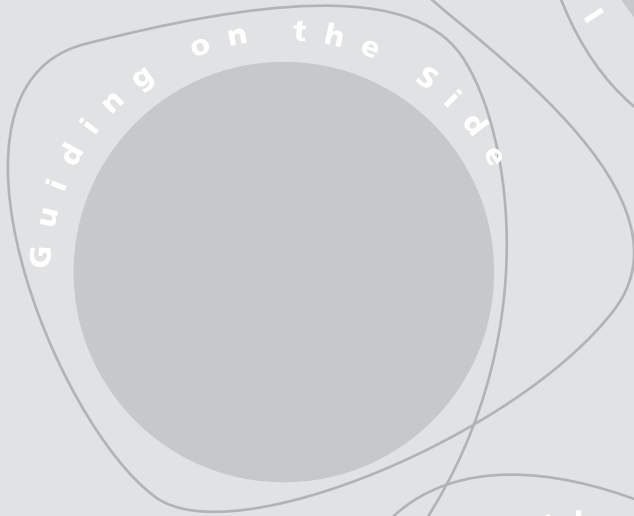
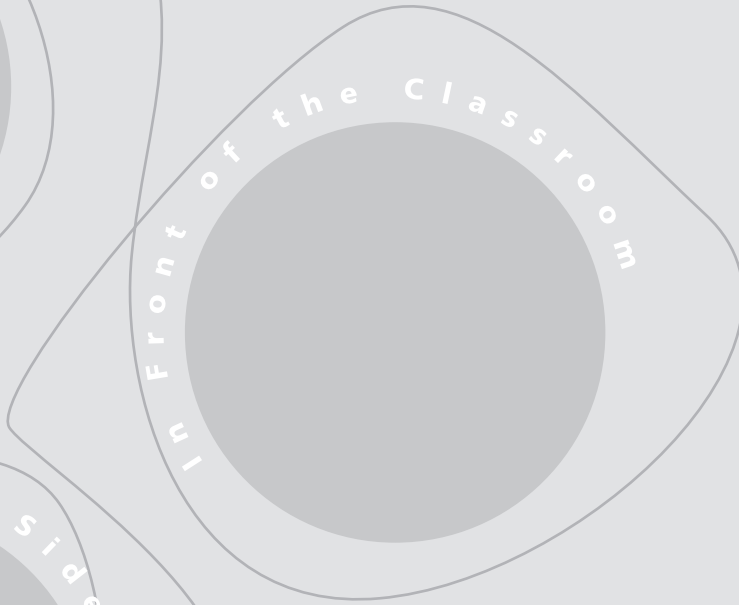
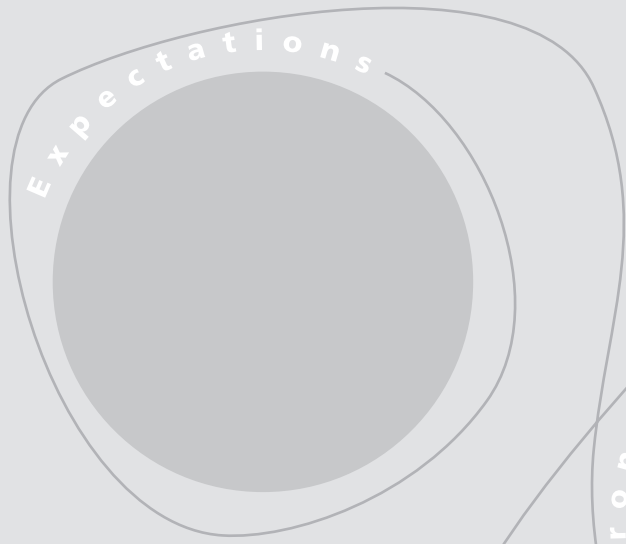
The Eberly Center for Teaching Excellence and the University Education Council recommend that all faculty and TAs use some form of early evaluation each semester. If you have never used early course evaluations, you can find some sample forms and guidelines for using them on the Eberly Center's website, www.cmu.edu/teaching/. Your department may also have a standard form or additional models. You can contact the Center about creating a form tailored to your needs or for help interpreting and responding to the feedback you receive.
- ✓ **Documentation of Teaching Development for future faculty.**

The purpose of this program is to prepare graduate students to be effective and efficient as new professors. Participants attend seminars, receive feedback on observations, develop a course and syllabus, and complete an individual project. Upon completion of the program, participants receive a detailed letter describing their teaching development for use in a job search. Those who complete a substantial number of activities can receive a Teaching Development Transcript.

Checklist: Support for TAs and Future Faculty

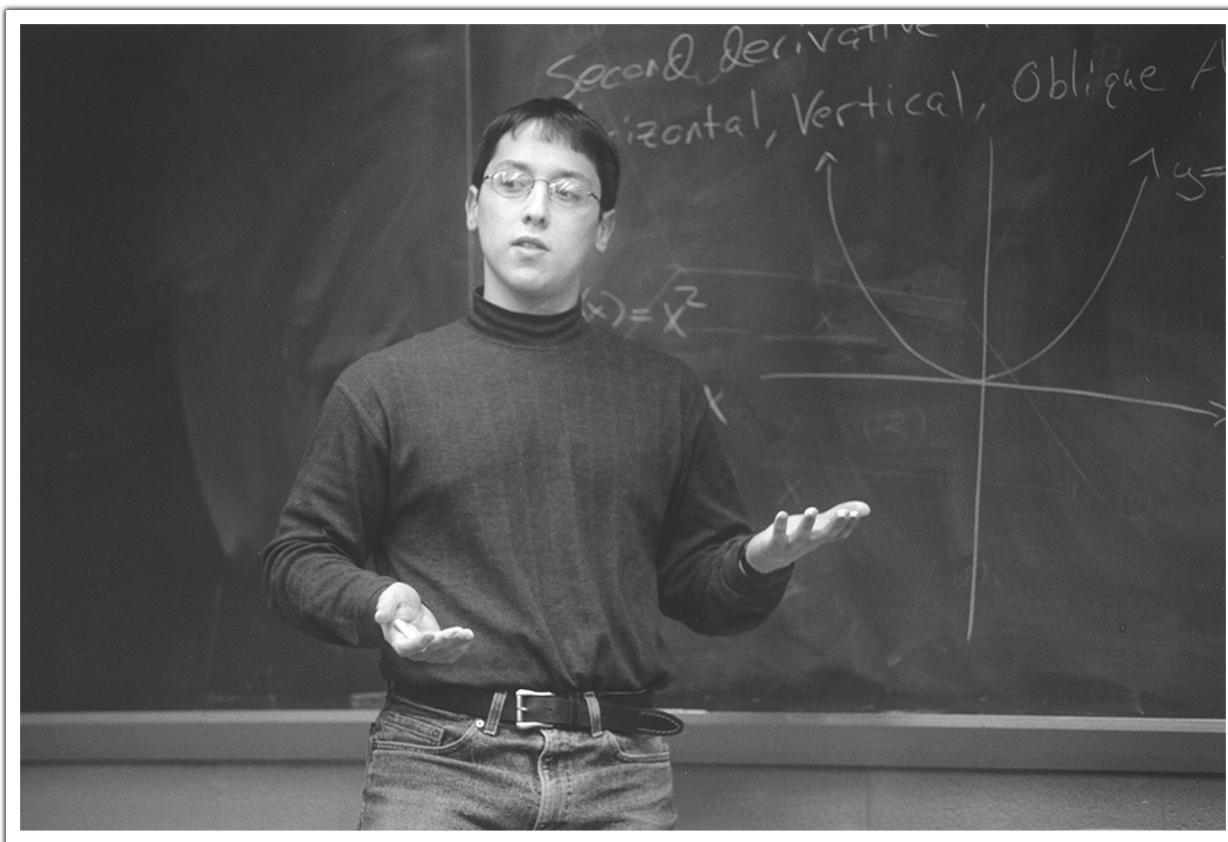
continued

- ✓ **Monthly reading/discussion group.**
A small group of graduate students meet informally each month to discuss readings on college teaching and other issues related to the teaching component of a faculty career. Participants are involved in selecting readings and rotate responsibility for leading the discussions.
- ✓ **Assistance with creating a teaching portfolio.**
Whether or not you participate in the Documentation of Teaching Development program, Center staff can advise you on assembling a teaching portfolio, which is a useful format for presenting evidence of one's teaching effectiveness for job searches. Creating a teaching portfolio, which usually includes a statement of teaching philosophy and sample course materials, is useful for reflecting on your teaching as a whole and for academic job searches. In addition, many institutions use it for reappointment and tenure decisions.
- ✓ **Individual consultations on any teaching-related questions.**
Graduate student TAs are invited to meet with Center staff to discuss difficulties related to teaching. Questions can be specific or general. For example, the Center has assisted TAs who have had disruptive or struggling students, TAs who have had trouble getting students to participate, and those who are concerned that they may be taking on too much responsibility in a course. All consultations are confidential.
- ✓ **Visits to TA meetings or departmental orientations.**
Eberly Center staff are available to discuss department-specific or course-specific teaching concerns on request. If a group of TAs identify an issue where additional support or training would be useful, they can contact the Center to discuss the options for addressing that issue.
- ✓ **Eberly Center's website, www.cmu.edu/teaching/.**
Among the online resources currently available are schedules of seminars, information about arranging observations and consultations, and guidelines for using early course evaluations.



Teaching**Resources**

Eberly Center for Teaching Excellence
Carnegie Mellon University



Frequently Asked Questions

Each college or university has different ways of supporting its faculty, TAs, and students in the teaching-learning process. While many of the answers below are specific to the Carnegie Mellon environment, the questions should be useful to ask anywhere you may teach in the future. This chapter describes resources to aid your continuing teaching development, provides information on common logistical and policy concerns, and briefly summarizes the support offered to all Carnegie Mellon students, which you may want to draw on to assist those in your classes. For your convenience, we provide contact information for key resources on page 140.

Support for Teaching and Professional Development

What kind of seminars, consultations, or other resources are available to help me survive and improve as a TA and in my future teaching?

The Eberly Center for Teaching Excellence offers support for both first-time TAs and experienced teachers and conducts seminars, peer observations, and teaching-related professional development programs such as the Documentation of Teaching Development for future faculty.

The Eberly Center is located in Cyert Hall 120. For information or consultations about any teaching-related issues, contact Hilary Schuldt, PhD, Associate Director, at hilary@cmu.edu or x8-1287. Programs are also described on the web at www.cmu.edu/teaching/.

Some colleges and departments offer non-credit and credit courses on college teaching and faculty careers. The College of Engineering offers 39-800, Preparing for Faculty Careers, which addresses preparation for both teaching and research. Contact the Dean's Office at x8-2479 to register for this 0-unit course, which is open to graduate students in CIT, MCS, and SCS.

What resources are available to help nonnative speakers of English? Where can I get assistance in improving my teaching as a nonnative speaker and as someone who was educated outside of the U.S.?

The Intercultural Communication Center (ICC) offers over 25 credit classes, workshops, and seminars, as well as tutoring appointments, and self-paced appointments to help nonnative English speakers develop academic fluency and communication skills. The ICC also conducts a screening test for all nonnative English speakers who want to work as TAs.

The ICC is located in Warner Hall 308. For more information about their services, call x8-4979 or see the ICC website at www.cmu.edu/icc/.

Are there programs to help graduate students with other professional development issues such as job hunting, career planning, or finding external funding?

For general professional development and other graduate student issues, the Graduate Support Programs Office offers two year-long seminar series and two modest funding programs. They are the Professional Development Seminar Series, a series of seminars in business, management, and communications skills that helps prepare graduate students for successful careers in academic, corporate, public, and research sectors; the Doctoral Career Path Seminars feature the personal histories of panels of PhDs from a range of disciplines who have pursued a variety of careers. The panels focus on a different labor sector each year, alternating between academic careers and industry positions. The GSA Conference Funding Program and the Graduate Small Project Help Fund grant monies to graduate students seeking to defray costs of attending conferences and for degree-related research projects, respectively. The Graduate Support Programs Office also offers special programs for women and students of color and several mentoring resources. For more information, see www.cmu.edu/adm/gpo/.

Information on fellowships for undergraduate and graduate students can be obtained by contacting the Office of Scholarships and Fellowships at x8-1969 or visiting www.cmu.edu/frac/.

How can I learn about incorporating new technology or multimedia into teaching?

The Office of Technology for Education (OTE) Lab offers a variety of workshops and other resources to assist faculty who are incorporating technology into the classroom. Graduate student TAs are welcome to participate in these workshops and/or utilize these resources when space is available, and specific workshops for graduate students are offered as well. For more information about OTE programs, resources, a schedule of workshops, and extensive instructions about using Blackboard, see the OTE website at www.cmu.edu/teaching/.

How should I prepare to be a TA for a distance education course?

Teaching a distance education course adds another degree of complexity to the classroom. For links to a variety of useful tips on teaching distance education courses, visit www.cmu.edu/teaching/. Or you might consider contacting TAs who have taught the course or in that classroom before for advice. In addition, the Eberly Center (x8-2896) can arrange for consultations or peer observations to assist you in managing distance education issues.

University Logistics and Procedures

How do I get a copy of the class roster?

If you are not listed as the instructor of a specific section, you should ask the listed instructor if they have received the roster. If not, the instructor will need to visit Faculty Information On-Line in order to download the roster for you. If you are listed as the instructor, you can download your roster from Faculty Information On-Line, <https://acis.as.cmu.edu/grades/>. On the same page, you can also obtain a photo roster, which will help you learn your students' names.

How do I put items on reserve for my students?

Faculty members, instructors, and TAs can request that books be put on reserve for their classes using the Request menu in Cameo at <https://cameo.library.cmu.edu/> or in any of the three libraries. Find the item that you want to put on reserve in the Cameo library catalog, select Request, and choose "Place Course Reserves." Use the Course Reserve Request PDF form at www.library.cmu.edu/Services/Reserves/ReserveRequest.pdf or from the library home page (under User Services, click Course Reserves, click Use Course Reserve Request PDF to reserve additional items, (e.g., photocopies or personal copies of books). Extensive information on placing course reserves is available on the Libraries' home page under the Course Reserves link. For further information, contact the circulation desks: Hunt, x8-2444; Engineering & Science (E&S), x8-7217; or Mellon Institute, x8-3172.

How do I get access to basic audiovisual equipment in my classroom?

Media Technology Services (MediaTech) provides a wide array of audio-visual technology and technical assistance to the campus community. Through 2009, MediaTech will be renovating all Registrar-controlled classrooms and auditoriums to outfit them with the same equipment. The newly renovated rooms will have a lectern containing ports for a laptop, a DVD/CD player, and a document camera (which can be used to display transparencies, books or 3D models), as well as ports for any audio/visual device instructors might bring to the room, such as a VCR, camcorder, or iPod. In addition, large auditoriums will have a resident computer with similar imaging to what is installed on the Windows machines in the Clusters.

For information on what equipment is in your classroom, to place an order for additional equipment, or to view the help documentation on the newly installed equipment, including step-by-step guides and videos, visit MediaTech's website, www.cmu.edu/computing/mediatech/.

Can I request the use of a classroom for review sessions or makeup exams?

Classrooms may be reserved, on a space-available basis, except between 4:30-6:30 p.m. and during final exam periods. Reservation requests must be made through SpaceQuest, which you can access through www.cmu.edu/hub/. You will need to submit the following information: the course number, the date and time that you need a room, preferred locations, size of room needed/number of people attending, and any other relevant information. Reservation requests require two business days for processing.

What can I do if the classroom needs repairs?

For heating or cooling problems, broken furniture, etc., contact Facilities Management Services by email at pp0p@andrew.cmu.edu, by phone at x8-2910, or via the web at www.cmu.edu/fms/.

How do I reserve videotapes for my class?

All videotapes in CMU's general collection are listed in the library's online catalog, Cameo (<https://cameo.library.cmu.edu/>), and kept in the Video Collection on the lower level of Hunt Library. Anyone with a valid Carnegie Mellon ID can check out a video to be watched there. To search for videos, be sure to include "video" as a keyword in Cameo, or choose the item type "video" when doing a complex search in Cameo.

To obtain videotapes for use in a class, visit the Video Collection Office in Hunt Library (lower level) or call x8-6075. If you are listed as

the instructor of record, you can arrange to take out videos overnight to preview them for class use and can take them out during the day for showings. If you are not the instructor of record, arrangements must be made by the official instructor, although he or she can specify that you, as TA, will be the person picking up and returning the tapes. Hours for the Video Collection can be found on the Library's home page, www.library.cmu.edu/; under Library Hours, click Hunt Library, scroll to bottom of Point of Service Hours.

What can I do as a TA regarding enrollment issues (e.g., add/drop requests, withdrawals) or grade issues (e.g., grade changes, incompletes)?

If you are the listed instructor for a course, you should have access to Faculty Information On-Line (<https://acis.as.cmu.edu/grades/>), where you can electronically submit grades and incompletes. You can also give approval for grade changes. Your department can provide you with the appropriate forms; however, depending on your department you may be required to seek the approval of the lecture instructor before submitting/approving any changes.

If you are not the listed instructor, you must request that the instructor of record complete the changes or grade submissions. Your department can provide you with the appropriate forms.

Laws and Policies Relevant to Teaching

What do I need to do to be sure to respect my students' privacy?

According to the Family Educational Rights and Privacy Act ("FERPA"), also known as the Buckley Amendment, all student academic information, including all grades, must be held confidential. That means that a TA or instructor should neither put graded student papers out in a public place to pick up, nor post grades in a public place. Similarly, semester or midterm grades should not be discussed by e-mail, only by phone or in person. For further information on the student privacy rights, please refer to the University Policy on Student Privacy Rights.

What should I do if I think a student is cheating or plagiarizing?

The first step is always to contact the faculty member with your concerns and any evidence you have. At that point, the instructor has primary responsibility for determining what steps will be taken. For more information, the full university policy on cheating and plagiarism, (including definitions of each term) is printed in the Graduate Student Guidebook. Strategies for preventing and responding to academic

dishonesty are in Promoting Academic Integrity: A Discussion Guide for the CMU Community, viewable online at www.studentaffairs.cmu.edu/acad_integ/acad_index.htm.

What do I need to know regarding sexual harassment issues?

Sexual harassment is specifically prohibited by Carnegie Mellon, and awareness workshops are conducted for TAs at the beginning of each semester. The complete Sexual Harassment Policy is available at www.cmu.edu/policies/documents/SexHarass.html. The page includes definitions, procedures for reporting incidents, and links to the current panel of advisors to whom individuals may bring their complaint.

What are the rules regarding photocopying for students in a class?

Before photocopying any copyrighted material (e.g., journal article, book chapter, etc.) to be distributed or sold (as in a course packet) to a class, you need to request permission to do so via the Copyright Clearance Center or call the Copy Center at x8-5772. The exception to this rule is for material discovered too close to the time of use to allow for permission to be obtained; such material can be copied for the class under the “fair use” doctrine. Note, however, that permission is only necessary for materials to be copied for an entire class. Single copies, allowable under the personal use exception, may be placed on reserve in the library for use by the class without requiring explicit permission. (See “How do I put items on reserve for my students?” earlier in this section.) For more information about these rules, call the Copy Center at x8-5772.

Currently, all active students, faculty and staff have a \$40 quota of copies that they can make in the computer clusters each semester. Your quota is debited each time you send a job to a printer. Types and sizes of paper are charged at different rates. For more information, see www.cmu.edu/computing/documentation/policies_clusters/clusters.html.

Support for All Students

What can I do for a student who has a learning or physical disability?

Any qualified student with a physical or learning disability is entitled by law to reasonable accommodations according to the Americans with Disabilities Act. If a student identifies himself or herself as having such a disability, TAs and instructors can ask if the student has a letter of certification, which documents the disability and describes the accommodations to be made. For students who already have a letter, contact either Academic Development at x8-6878 for students with learning disabilities or the Equal Employment/Affirmative Action (EEO/AA) Department at x8-2012 for students with physical disabilities for further information about accommodations. Students who may have learning disabilities should contact Academic Development for information on formal testing.

What can I do for a student who needs to work on study skills?

The Office of Academic Development (x8-6878) offers study skills assistance through their Academic Counseling Program. This program helps students acquire more effective and efficient study skills through both group workshops and individual appointments. Topics covered include: time management, textbook reading, lecture note-taking, test taking, memory, procrastination, and citing sources. For more information, call Academic Development or stop by the office at Cyert B5. For a complete list of workshops, visit www.cmu.edu/academic-development/.

What should I do if I have a student who appears to be having personal problems that interfere with his or her work?

The first contact should be the faculty member, who may have more information than you do. If further help seems useful, the primary source of referrals for students having personal difficulties is the Dean of Student Affairs Office (x8-2075), which can provide a liaison for that student's college to connect the student with appropriate support, counseling or resources as needed. Graduate students who may be experiencing difficulties can contact the Dean of Student Affairs Office for support and referrals also.

What should I do about a student who doesn't seem to be able to manage his or her academic workload?

Again, contacting the instructor with any concerns should be the first step. Referrals might then be made to any of the following to assist the student academically: the student's academic advisor, the college's office of academic advising, the associate department head, the assistant or associate dean of the student's college, or the coordinator for Academic Development, as described under "What can I do for a student who needs to work on study skills?" The checklist on page 32 also offers steps for supporting students who may need help.

How can I help students find course-specific tutoring?

Peer Tutoring

Academic Development (x8-6878) offers subject-specific tutoring geared primarily (but not exclusively) towards large introductory courses. Walk-in tutoring is available five nights a week in selected residence halls for a variety of subjects including chemistry, calculus, engineering, physics, writing, etc. See www.cmu.edu/academic-development/ for a complete list of courses.

A limited number of individual tutoring appointments are also available upon request. If requesting a tutor, the student needs to visit Academic Development at Cyert B5 and fill out a tutoring request form. All students should visit walk-in tutoring and Supplemental Instruction prior to requesting an individual tutor.

Supplemental Instruction

Supplemental Instruction (SI) is an academic enrichment program that is offered in traditionally difficult courses. Interactive SI sessions are conducted twice each week and are voluntary for students enrolled in selected courses. SI sessions are designed to supplement – not replace – class lectures and recitations. For a complete schedule of SI, see www.cmu.edu/academic-development/.

Are there resources specifically for students who have difficulty writing?

Academic Development offers writing tutoring five evenings/week in selected residence halls. A selected number of individual appointments are also available by visiting the Academic Development office at Cyert B5 and filling out a tutoring request form. The Intercultural Communication Center offers a writing clinic for nonnative speakers, which can be of particular help to many undergraduates. There is no campus Writing Center at the moment.

Contact Information for Key Resources

Carnegie Mellon Advising Resource Center	x8-2150	. . . . .	Cyert A-64
www.cmu.edu/cmarc			
Counseling and Psychological Services	x8-2922	. . . . .	Morewood E-Tower 2nd floor
www.studentaffairs.cmu.edu/counseling			
Eberly Center for Teaching Excellence	x8-2896	. . . . .	Cyert 120
www.cmu.edu/teaching			
Equal Opportunity Services	x8-3930	. . . . .	Whitfield Hall 143 N. Craig Street
http://hr.web.cmu.edu/current/eos			
Fellowship Resource Advising Center	x8-1969	. . . . .	Warner 530G
www.cmu.edu/frac			
Graduate Support Programs	x8-7970	. . . . .	Warner 527G
www.cmu.edu/adm/gpo			
HUB (Enrollment Services)	x8-8186	. . . . .	Warner A-19
www.cmu.edu/hub			
Intercultural Communication Center	x8-4979	. . . . .	Warner 308
www.cmu.edu/icc			
Media Technology Services (MediaTech)	x8-2430	. . . . .	Cyert A-74
www.cmu.edu/computing/mediatech			
Office of Academic Development	x8-6878	. . . . .	Cyert B-5
www.cmu.edu/academic-development			
Office of International Education	x8-5231	. . . . .	Warner 3rd Floor
www.studentaffairs.cmu.edu/oie			
Office of Student Affairs	x8-2075	. . . . .	Warner 301
www.studentaffairs.cmu.edu			
Office of Technology for Education	x8-5503	. . . . .	Cyert 101
www.cmu.edu/teaching			
Undergraduate Research Office	x8-5702	. . . . .	Warner 531
www.cmu.edu/uro			

References

Ambrose, S.A., Freeland, R. & Bridges, M. (2007). 3rd edition. *Best Practices for Teaching First-Year Undergraduates*. Pittsburgh, PA: Eberly Center for Teaching Excellence, Carnegie Mellon University.

Brown, G. & Atkins, M. (1988). *Effective Teaching in Higher Education*. London, England: Routledge.

Davidson, C.I. & Ambrose, S.A. (1994). *The New Professor's Handbook: A Guide to Teaching and Research in Engineering and Science*. Bolton, MA: Anker Publishing.

Davis, B.G. (1993). *Tools for Teaching*. San Francisco, CA: Jossey-Bass.

Freeland, R. (1996). *Resources for TA Training and Development*. Pittsburgh, PA: Eberly Center for Teaching Excellence, Carnegie Mellon University.

Handbook for Teaching Assistants. (1996). Amherst, MA: Center for Teaching, The University of Massachusetts Amherst.

Luttrell, W. (1995). *Developing Teacher Knowledge: A Workbook for Teaching Assistants*. Durham, NC: Center for Teaching and Learning, Duke University.

Marincovich, M., Ed. (1995). *Teaching at Stanford: An Introductory Handbook for Faculty, Academic Staff/Teaching and Teaching Assistants*. Stanford, CA: The Center for Teaching and Learning, Stanford University.

McKeachie, W.J. (2006). *Teaching Tips: Strategies, Research and Theory for College and University Teachers, Twelfth Edition*. Boston: Houghton Mifflin.

Promoting Academic Integrity: A Discussion Guide for the CMU Community. (1995). Pittsburgh, PA: Eberly Center for Teaching Excellence and Office of Student Affairs, Carnegie Mellon University.

Teaching at The Ohio State University: A Handbook. (1996). Columbus, OH: Faculty and TA Development, The Ohio State University.





Acknowledgments

This project was funded by the Office of the Provost. We would especially like to thank Ed Ko, former Vice Provost for Education, for his support and input on this project and other Eberly Center programs.

Brian Zikmund-Fisher, Coordinator of TA Support, and the Teaching Fellows of the Eberly Center for Teaching Excellence were instrumental in conceptualizing this project and bringing it to fruition. They helped to collect and organize data, contributed text, provided feedback on previous drafts, and advised on the overall organization of this book.

Julia Deems
Joanne Kehlbeck
Laurie Levesque

Fernando Olivera
Ranga Ramanujam
Josh Silverman
Jeff Suzik

The following graduate and undergraduate TAs participated in the focus group meetings across all of the colleges and contributed the strategies at the heart of this book.

CFA

Michael Cumming
Jennifer Ferenz
Joan Guerin

CIT

Manish Agarwal
Stephanie Butler
Richard Chin
Sari Coumeri
Sam-Joo Doh
Scott Godsen
Nestor Gomez
Judy Hill
Nate Klingbeil
Douglas Lambert
Yufeng Liu
Jonathan Luntz
Mark Mescher
Andrea Sterdis
Mark Vesligaj

Heinz

Deborah Brown
Wei Gao
Rob Greenbaum
Cathleen McGrath
Snehal Tijoriwala

H&SS

Michelle Broge	Terri Palmer
Ilaria DiMatteo	Bethany Rittle-Johnson
Michele DiPietro	Ashish Sanil
Alix Gitelman	Howard Seltman
Kevin Gluck	Sally Sleeper
Tim Herron	Lisa Tamres
Susan Lawrence	Gilbert Vanburen Wilkes
Courtney Maloney	Susannah Walker
Sabine Marx	David Wolcott
Jamie Ogline	Carl Zimring

MCS

Shubho Banerjee	Alexei Kolesnikov
James Burnette	Sarah Locknar
Krishna Chowdary	Amy Mehta
Selene Clark	Melissa Pasquinelli
Brian Diggs	Matt Peterson
Rick Edgington	Vidhya Ramachandran
Nadine Fattaleh	Daniel Rosenberg
Marion Gehrman	Dan Savin
Ally Hatton	David Seidman
Andrew Harey	Steven Vanni
Matt Kohlmyer	Len Vuocolo
	Christine Woomer

SCS

Doug Baker
Deepak Bapna
Brian Cavalier
Craig Damon
Dave Maltz
William Uther
Andrew Zimdars

Tepper

Don Harter
Vanessa Hill
Eduardo Jallath-Coria
Lille Springall-Gautier
Zili Zhuang

Thanks to the faculty and staff who contributed valuable written materials on working with TAs.

Susan Ambrose	George Klein
Cristina Amon	Chris Okasaki
Sharon Carver	Bruce Sherwood
Carol Hamilton	Hugh Young

Finally, we appreciate the assistance of many thoughtful reviewers of earlier drafts.

Susan Ambrose	Eduardo Jallath-Coria
Dick Hayes	Vanessa Hill
Jay Kadane	Sarah Locknar
Ed Ko	Serhat Ozdemir
Barbara Lazarus	Andrew Parker
Sue McNeil	Matt Peterson
Mark Stehlik	David Rode
Karen Stump	Sally Sleeper
Russ Walker	Lille Springall-Gautier
Manish Agarwal	Len Vuocolo
Jana Asher	Alex Weissman
Craig Damon	Amanda J. Young
Michele DiPietro	Carl Zimring
Joan Guerin	

We would like to thank those who contributed and updated information for the third edition in 2007:

Don Coffelt	Dawn Jackson
Cliff Davidson	Nancy Klancher
Joseph Devine	Kurt Larsen
David Dzombak	Michelle McClory
David Eckhardt	James Mercolini
Hilary Franklin	Beverly Mickens Jones
Peggy Heidish	Lisa Ritter
Patricia Herbster	Joan Stein
Holly Hippensteel	Christine Zeise
Linda Hooper	

Design by
Judy Brooks

Photography by
Ken Andreyo

Statement of Assurance

Carnegie Mellon University does not discriminate and Carnegie Mellon University is required not to discriminate in admission, employment, or administration of its programs or activities on the basis of race, color, national origin, sex or handicap in violation of Title VI of the Civil Rights Act of 1964, Title IX of the Educational Amendments of 1972 and Section 504 of the Rehabilitation Act of 1973 or other federal, state, or local laws or executive orders.

In addition, Carnegie Mellon University does not discriminate in admission, employment, or administration of its programs on the basis of religion, creed, ancestry, belief, age, veteran status, sexual orientation or gender identity. Carnegie Mellon does not discriminate in violation of federal, state, or local laws or executive orders. However, in the judgment of the Carnegie Mellon Human Relations Commission, the Presidential Executive Order directing the Department of Defense to follow a policy of “Don’t ask, don’t tell, don’t pursue” excludes openly gay, lesbian and bisexual students from receiving ROTC scholarships or serving in the military. Nevertheless, all ROTC classes at Carnegie Mellon University are available to all students.

Inquiries concerning application of these statements should be directed to the provost, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, telephone 412-268-6684 or the vice president for enrollment, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, telephone 412-268-2056.

Carnegie Mellon University publishes an annual campus security report describing the university’s security, alcohol and drug, and sexual assault policies and containing statistics about the number and type of crimes committed on the campus during the preceding three years. You can obtain a copy by contacting the Carnegie Mellon Police Department at 412-268-2323. The security report is also available online.

Obtain general information about Carnegie Mellon University by calling 412-268-2000.

Eberly Center for Teaching Excellence

The Eberly Center for Teaching Excellence helps faculty and graduate students to improve teaching practices by gaining an understanding of cognitive and educational principles of teaching and learning and by reflecting, practicing, and receiving feedback on course design and classroom performance.

The Eberly Center offers both public forums to discuss and explore issues related to teaching and learning and private consultations on course design, implementation, and evaluation. Individual consultations are strictly confidential.

Hilary Schuldt, PhD
Associate Director, Graduate Programs
hilary@cmu.edu
(412) 268-1287
<http://www.cmu.edu/teaching>

CarnegieMellon



5000 Forbes Avenue
Cyert Hall 125
Pittsburgh, Pennsylvania 15213
www.cmu.edu/teaching