The Penn State Teacher II

LEARNING TO TEACH, TEACHING TO LEARN

BY
DIANE M. ENERSON
R. NEILL JOHNSON
SUSANNAH MILNER
KATHRYN M. PLANK

University Park, Pennsylvania
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Center for Excellence in Learning and Teaching
401 Grange Building
University Park, PA 16802
Office: (814) 863-2599
Fax: (814) 863-8411
E-mail: celt@psu.edu

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Foreword

The Schreyer Institute for Teaching Excellence is happy to provide you with this electronic version of *The Penn State Teacher II*. The hard copy of this guide, which is now out of print, has been widely used by Penn State faculty and graduate instructors, as well as faculty members at other institutions of higher education around the globe. The first printing of this second edition was in 1997; consequently, some references to teaching and learning resources are now outdated. However, the advice and guidance provided here by your faculty peers and former students will undoubtedly continue to be of enduring value as you look for ways to engage present and future students.

RENATA S. ENGEL
Associate Vice Provost for Teaching Excellence

Preface

Teaching, which is a general term for various activities that cause others to learn, is a difficult, demanding and creative enterprise—a sometimes frustrating, yet an altogether satisfying one. Currently, teaching is undergoing dramatic change, with heightened expectations for teacher and learner alike. A major trend is toward greater concentration on the impact of teaching on the learner, a theme that recurs throughout this book.

Over the years, students will be more active learners and more in the habit of learning, typically having an information-seeking mindset and the technical skills to apply it successfully. They will be more experienced at collaboration and teamwork than their forebears, and they will be more diverse in their styles of learning. Students will be expected to understand fundamentals not passively, but by having applied the fundamentals enough to have questioned them.

Many classroom experiences will be active and collaborative, restless and changing. Classes will be packaged more flexibly, and many will be delivered in an anytime-anyplace, electronically-aided mode. Schedules will be become increasingly flexible, and classrooms will look very different. Some won't be recognizable at all when compared with current practices. The faculty will continue to work well and hard. Some, however, will play a different role, not as knowledge dispensers, but as mentors, coaches, motivators, and critics.

In this changed learning environment, it will be useful to have the guidance and wisdom of some of Penn State's best teachers, together with the commentary of the experts who work with them on meeting these new teaching challenges. That is what the new edition of The Penn State Teacher brings to us. It is welcome, indeed.

JOHN J. CAHIR
Vice Provost and Dean for Undergraduate Education

Acknowledgements

As the authors of the first edition of *The Penn State Teacher,* we would like to thank the many individuals who made this second edition possible. First, we would like to thank all those Penn State teachers and students who have participated in our programs, responded to our appeals for information and surveys, kept us informed of new discoveries or otherwise supported our mission to act as a neutral catalyst for excellence in learning and teaching at Penn State. Without their collective interest, support, enthusiasm, and candor this book could never have been written.

We would also like to offer special thanks to those individuals who contributed material to the text. Some graciously agreed to lead discussions, seminars, or workshops for CELT, the edited transcripts of which are included in the book. Others allowed us to use examples from their own teaching that they discussed in various CELT programs. Several alumni of our Course in College Teaching responded enthusiastically to our request for essays and teaching philosophies. And many undergraduates submitted essays in an essay contest sponsored by CELT. All of these teachers and students have contributed both to this book and to the positive changes in the culture for teaching and learning at Penn State.

In addition, we want to thank those who made substantive and insightful comments on early drafts: Sydney Aboul-Hosn, Lee Ann Banaszak, Michael Dooris, Bill Farnsworth, Carol Gay, Peter Gold, John Harwood, Claudia Limbert, John Lowe, Chuma Mbalu Keswa, Scott McHugh, Robert Mitchell, John Moore, Eliza Pennypacker, James Rambeau, Marilynne Stout, Dennis Shea, Don Thompson, and Fern Willits. Their suggestions and revisions have resulted in a final version far better and more comprehensive than we could have accomplished on our own. Special thanks must go to John Cahir, Vice Provost and Dean of Undergraduate Education, who not only read and commented carefully on drafts but has given unfailing support to *The Penn State Teacher II* and all of CELT's programs.

Finally, we must thank the entire staff of CELT who have brought new meaning to the word “collaboration” and whose commitment, dedication and good humor have kept us from giving up when things did not always go according to plan. Susannah Milner completed the enormous, difficult, and sometimes frustrating task of weaving together new and old, filling in gaps, and coordinating countless revisions, additions, and subtractions. In addition to contributing several sections that have added considerable breadth to the text, R. Neill Johnson should also be thanked for his characteristically perceptive comments and insightful readings, which as always have been invaluable. And with her characteristic precision and eye for detail, Ann Rigo has read and copy edited several drafts, providing comfort to all as we prepare to go to press. Sherri Gilliland too must be thanked for her unfailing good nature and persistence as she gathered, checked, and double-checked information for appendices and footnotes. And last, but certainly not least, very special thanks must got to our undergraduate writing interns—Rob Billingham, Elizabeth Danzico, David Klopach, Kelly Nath, and Melanie O’Donnell—who along with the many unnamed undergraduates who have responded to our surveys have over the years have brought “learning” to our title, as well as great richness to this text, an impact of nontrivial importance that hopefully will last for many years to come.

DIANE M. ENERSON
KATHRYN M. PLANK

Center for Excellence in Learning and Teaching

University Park, Pennsylvania
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Introduction

This new edition of *The Penn State Teacher* should find a very different community of teachers from that which greeted the first edition in 1993. Four years ago, *The Penn State Teacher* was welcomed as something new. Readers were pleased to find a text that gave voice to some of the excellent teaching at Penn State and provided a central identifiable focus for issues of teaching and learning. Much has changed since then, however. Attendance at advertised events about teaching and learning is no longer limited to the "usual suspects." Today many more voices are contributing to the conversations, which have become an expected part of the Penn State culture. New initiatives aimed at strengthening and enhancing some aspect of the teaching-learning process emerge each semester.

We have witnessed this change first hand at the Center for Excellence in Learning and Teaching (CELT), where participation in our events has not only increased dramatically, but has also often exceeded our wildest predictions. When we began offering a course in college teaching, for example, skeptics warned us of our folly. We were, they said, unrealistic. How could we expect people already strapped for time to devote precious hours to a course that offered no tangible incentive (e.g., money, prestige, political advantage, or academic credit)? But our own survey data suggested that there were indeed many within the Penn State community who would eagerly welcome an opportunity for sustained discussions about teaching, as long as those discussions offered immediately useful insight and a neutral framework within which to begin thinking about teaching.

Evidently our analysis was correct. Since its inception in fall 1992, annual enrollment in our Course in College Teaching grew quickly and has remained at well over 100 for the past two years. Although our original participants in the course were for the most part graduate student instructors, roughly a third of those who participate each year are faculty. For ten weeks, course participants come together to reflect on what they are doing in the classroom, share their successes and failures, learn from and provide support to one another as well as discuss some of the current literature on teaching. These discussions are always lively, and they are always productive. Similarly, attendance at our Roundtable Discussions for teachers of

large class sections has been consistently strong since they began in August 1996. More importantly, the impact of this series has been impressive, with nearly all of our participants reporting at least one improvement in the courses they teach as a result of something they learned during the discussions.

The success of these and other programs is clear evidence of a growing interest in discussing—and improving—teaching and learning at Penn State. And happily, this interest is not exclusive to CELT. Across the University, participation in activities related to teaching have proliferated no less rapidly. Educational Technology Services (ETS), for example, instituted a new set of seminars on teaching and learning with technology which drew close to one thousand participants in its first year. The Schreyer Institute for Innovation in Learning (SIIL) has been up and running for two years with enthusiastic participation in its noontime conversations and funding opportunities. The Provost's annual Colloquy series has drawn well over a hundred participants on each occasion. Assorted programs in departments and colleges are no longer limited to a few individuals exchanging ideas but are rapidly becoming institutionalized at every level throughout the University. Similarly, programs that offer new kinds of learning opportunities for undergraduates such as the College of the Earth and Mineral Sciences and the Liberal Arts Freshman Seminars, the Dynamic Physics project, and the Learning Edge Academic Program (LEAP) have also become more prominent and plentiful during the past four years.

All the signs point in the same direction—the culture for teaching and learning at Penn State is changing. While this evolution may be faster in some areas than in others, it would be difficult to deny the increasing visibility and frequency of the discussions about teaching and learning. It would appear that any institutional shyness about disclosing what transpires in the classroom has vanished. In 1993, it was commonly argued that teaching was something you did when others weren't looking. In polite society, good neighbors do not pry—never mind that there are often 300 students present in the room. Teaching was still perceived by many to be a highly personal and private affair. When discussions about teaching (and learning, which was less frequently discussed) did occur, the cultural imperative at that time was to keep them as technical as possible. Systematic analysis of what went on in the classrooms or in our students' minds was viewed, more or less, as vaguely irrelevant.

Although speaking about a different university, Jane Tompkins has struck a resonant chord for many Penn State teachers when she confesses that "teaching was exactly like sex for me—something you weren't supposed to talk about or focus on in any way but that you were supposed to able to do properly when the time came." Consequently, "people rarely talk about what the experience is really like for them, partly because . . . there's no vocabulary for articulating the experience and no institutionalized format for doing so."[1] This inhibition results in what Tompkins refers to as "the performance model of teaching." Not surprisingly, the performance model—which is still prevalent and is often encouraged by institutional practices such as student evaluations—focuses not on what the student is doing but solely on what the

teacher is doing. The primary focus in this model is for teachers to demonstrate how smart, knowledgeable, and how well prepared *they* are, with little if any attention being directed toward what the students are doing.

Tompkins' "performance model" stands in marked contrast to the one that is evolving at Penn State and elsewhere, in which the learner—and what goes on in the mind of the learner—is placed at the center of the discussion. Less and less do discussions focus on superficial aspects of the teacher's behavior. But more and more they are focusing on the difficult questions about learners. Increasingly, groups of faculty, graduate student instructors, or administrators who are asked to reflect on the question "What is good teaching?" respond in remarkably similar ways. Although charisma and entertainment appeal may occasionally be mentioned, the real heart of each discussion lies elsewhere. These discussions nearly always end in complete agreement with Patricia Cross when she observes that "while learning has many ends, teaching has only one: to enable or cause learning."[2] One case in point is a recent survey of Penn State students finding that the single strongest predictor of overall satisfaction with a course was how much students believed they had learned.[3] Almost without exception, those queried report that what is most memorable is not what the *teacher* did, but what they as the *learners* saw, did, or discovered *because* of what the teacher did. Great teachers live forever not because they give flawless performances but because they change forever the way their students think.

Teaching is increasingly being recognized as a complex and multifaceted product of many variables, not the least of which are what the learners *and* the teacher each bring to the situation, as well as the nature of the subject matter at hand. This complex view of teaching reflects clear progress from where we were four years ago and movement toward a point at which teaching becomes, in the words of Lee Shulman, "community property."[4] Penn State today is a place where what goes on in classrooms has become more public, a place that more comfortably embraces serious engagement with issues of teaching and learning, and where members of the community join in meaningful discourse about teaching at every level.

So, when in the autumn of 1996 we discovered we had distributed almost all of the original printing of *The Penn State Teacher*—usually at the request of a department or individual—we wondered about the relative merits of a reprint versus a revised second edition. It was clear that many found the existing edition useful. Numerous departments were using it annually as part of an orientation program or course

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1 Jane Tompkins, "Pedagogy of the Distressed," *College English* 52, no. 6 (1990): 655-656.

2 K. Patricia Cross, "In Search of Zippers," *AAHE Bulletin* 40, no. 10 (1988): 3.

3 Fern K. Willits, Betty L. Moore, and Diane M. Enerson, *Penn State—Quality of Instruction: Surveys of Students and Teachers at University Park* (University Park: Center for Excellence in Learning and Teaching, 1997).

4. Lee S. Shulman, "Displaying Teaching to a Community of Peers" (address delivered at the American Association of Higher Education National Conference on Faculty Roles and Rewards, 30 January 1993).

for new faculty and graduate student TAs. We used it in our own Course in College Teaching. The most obvious—and certainly the easiest—solution to our problem would have been a reprinting of the existing volume. But could we do this and still acknowledge the cultural transformations that had occurred? Would this option significantly further that cultural transformation that had begun over the past four years?

We didn't think so. Nor would this option allow us to articulate our own evolution and new understandings about what is involved in becoming skillful teachers. In the years since *The Penn State Teacher* was first published much had changed within our office as well. The activities and services we offered had undergone considerable evolution. We had a new name—the Center for Excellence in Learning and Teaching—that reflected these changes.[5] We had logged thousands of additional hours working and talking with faculty, gaining new information about teaching at Penn State in the process. More importantly, we had also learned a lot of new and interesting things about what activities are most helpful in fostering an atmosphere that leads to excellence in learning and teaching.

Clearly, only a new volume could reflect these important changes while also allowing us to reflect *on* them. To guide the revision process, we looked to our Course in College Teaching. It only made sense to have the new edition follow the course's structure and incorporate what we had learned from developing and teaching the course. One of the most significant of these lessons was how much easier it is to encourage good teaching when discussions are focused on the fundamental activities of teaching (i.e., verbs like "planning," "assessing," and "revising") rather than discrete topics (i.e., nouns such as "learning styles" and "classroom management"). These changes, evident in new chapter titles and subheadings, go beyond semantics however and reflect a significant "re-vision" of the book.

The revised edition also includes considerable new material. In the last four years, Penn State teachers have shown a growing interest in a number of issues like collaborative learning and classroom assessment. Accordingly, we have expanded our chapter on teaching methods to include collaborative learning and problem solving and have added an entire new chapter on classroom assessment. Our own programs, such as the discussions for teachers of large class sections and the short course on the teaching portfolio, have also suggested some special topics of interest. Consequently, we have added two other new chapters. Chapter 3 addresses some of the unique circumstances of teaching and learning in the specific context of Penn State. Chapter 6 explores the complex issues of how we approach teaching as a scholarly activity. In addition, because computers have begun to permeate all aspects of teaching and learning at Penn State, we have added a piece in chapter 3 and have incorporated numerous examples using technology throughout the book.

This new edition also includes many more texts by members of the Penn State community than did

[5] Until the fall of 1996, CELT was known as the Instructional Development Program (IDP).

the first edition of *The Penn State Teacher*. Perhaps the greatest impact of the first edition was the voice it gave to some of Penn State's "master" teachers. Highly skilled and dedicated individuals like John Lowe, Robert Mitchell, John Moore, Marie Secor, Larry Spence, and Jackson Spielvogel had been recognized University-wide for their excellence as teachers. Many readers gained both good ideas and inspiration from the willingness of these celebrated teachers to share what they had learned. Since 1993, however, the sense of community around issues related to teaching has been greatly strengthened and broadened. Now, in addition to those who have won awards, many others at all levels from TA to full professor are enthusiastic about displaying their skill and dedication to teaching. In order to better represent this heightened sense of involvement in teaching and learning, we have sought to incorporate many more Penn State voices—those of both teachers *and* students. By doing so, we hope not only to reflect the Penn State community, but also to encourage further dialogue and discussion.

Thus, to capture the "re-vision" that underlies these changes, we have modified the title—*The Penn State Teacher II: Learning to Teach, Teaching to Learn*—just enough to make it clear to the reader that this is in effect a new book, with a new underlying structure and a new audience. The first edition had been entitled simply—*The Penn State Teacher: A Collection of Readings and Practical Advice for Beginning Teachers*—because we had assumed our audience was primarily those teachers who were the newest to Penn State and/or the newest to teaching. Evidently, our assumptions were incorrect. With nearly 7,000 copies of the first edition in circulation, many besides TAs and new faculty are obviously reading it.

Finally, the feedback we have from faculty at all levels and all locations throughout Penn State suggests that this has been a volume that a diverse group of teachers find useful for a variety of reasons and purposes. Some, for example, use it as a catalyst for their discussions with TAs they are mentoring. The revisions should make this use both easier and more productive. Others, some with decades of successful and dedicated teaching, simply report that they found it reaffirming and refreshing. We are hopeful the revisions will add significantly to these readers' discoveries and pleasures. And others still report using it as a first reference, especially when tackling a new teaching assignment. We hope these readers will continue to make such use of this new edition.

What is good teaching?

DIANE M. ENERSON

Director, Center for Excellence in Learning and Teaching

This is a question I have asked and have been asked literally hundreds-possibly thousands-of times. Countless research

articles, books, and essays have been written on it, an astonishing number of which I have read. Although the basic approach to the task may differ, the findings and general claims often bear a striking resemblance to one another. Similarly, the many voices within this book offer a diverse set of perspectives and approaches to teaching while still agreeing on a few basic conditions of good teaching.

In the voices from outside Penn State as well as within there is a general consensus. Good teaching is a complex process that begins and ends with students. It takes into account who they are, what they already know, what interests they may already have, and what they will need to know. Focusing on students in this way can mitigate, if not totally prevent, the all-too-common experience of completing the "perfect" explication of a critical concept only to discover later that your students have imposed some entirely "new" meaning on what you thought you said. Focusing on the students and what they need to learn is also comforting. To quiet the inevitable stage fright that overcomes me when walking into a class for the first time, I always find it helpful to ask, "What two new ideas or concepts do I want my students to walk away with today?"

There is also very little disagreement that good teaching-especially at the university and college level-demands a high level of subject matter expertise. But subject expertise alone does not a good teacher make. The difference between subject expertise and the kind of explanatory expertise that results in good teaching is real and important. Explanatory expertise involves more than merely telling students what you know in the hope that they will come to know it too. Rather, it involves revealing the solutions to the problems and also how you got there. In a sense, the real difference between being an expert in something and being an expert who teaches is showing your students how you got-and how they can get-the rabbit out of the hat.

There is generally also consensus that good teaching plays off the strengths of each individual teacher. Good teachers fall back on their strengths while working on their weaknesses. Cute tricks and theatrics are not my forté, so I don't try to use them. Your love and enthusiasm for the subject matter, your belief that it is relevant, important, and absolutely fascinating is critical. Enthusiasm is compelling and infectious. Lack of enthusiasm is also infectious, but it is deadly.

Finally, good teaching is about community. Like a good community, good teaching is purposeful, open, just, disciplined, caring and celebrative.[6] But as Bunny Willits notes in the recent report on *Penn State as a Community of Learning*, these are abstract principles that "need to be personalized in time and space.[7]" Implementation is not always easy. And the same strategy does not work in every situation. There are no simple algorithms that will guarantee good teaching. A specific strategy like taking attendance or requiring homework may work in one class but not in the next. What works for me may not work for you. But each solution suggests another, which in turn suggests still others. We can always learn from one another.

While there is no one-size-fits-all strategy for good teaching, happily there are a few activities that do seem to make a difference and around which this book is designed. One such activity is planning. Good teaching involves planning, lots of it and at every level. What do I want my students to learn? It's hard to get somewhere if you don't know where you are going. What makes the subject interesting to me? What will make it interesting to my students? Good teaching also involves adapting to the constraints of the circumstances in which we teach, including the constraints of students' prior knowledge and the constraints of scale. Good teaching never happens in a vacuum but is part of a larger cultural and institutional context. Good teaching involves feedback-both feedback collected *from* your students and feedback provided *to* them. Feedback, accurate feedback, is the bedrock that supports learning. It is necessary for learning. And good teaching involves critically analyzing and responding to the feedback. Finally, good teaching is about self knowledge and growth. Finding and respecting your limits is an important part of effective teaching.

We began the previous edition of *The Penn State Teacher* by noting that good teaching requires a considerable amount of thought, planning, and self-analysis. The same principles underlie this new edition. Good teaching is an

ongoing, iterative process that involves careful planning, feedback, analysis, and the courage to try again when things don't go quite as expected. As even a cursory glance at the philosophies in the appendix of this text will attest, good teaching is something that is always labor intensive, sometimes frustrating, but doable. And it is worth the effort.

[6] These six characteristics of communities of learning are described by Ernest Boyer in his paper *In Search of Community*. Paper presented at the Annual Meeting of the American Council on Education (Washington, DC, January 10, 1990) and The Carnegie Foundation for the Advancement of Teaching, *Campus Life: In Search of Community*, Princeton, NJ: The Carnegie Foundation for the Advancement of Teaching, 1990.

[7] Fern K. Willits, Jeanette O. Janota, Betty L. Moore, and Diane M. Enerson, *Penn State as a Community of Learning: A Survey Report with Supplemental Readings* (University Park: Center for Excellence in Learning and Teaching, 1996).

I. Designing a Class that Motivates Learning

Central to the definition of good teaching is the idea that it is not a thing to be achieved, a standard to be reached; rather, like other kinds of scholarly activity, it is an ongoing process, a continual cycle of planning, assessing, and revising.

Effective teaching thus begins with planning. Courses must be planned, units must be planned, and each class session must be planned. However, planning goes beyond merely listing the material that needs to be "covered" in a course. It is a core process of teaching, a combination of problem-solving and decision-making that forces you to reflect on fundamental questions: What are your objectives? What is the most effective way of accomplishing those objectives? How are you going to determine whether or not the objectives have been reached?

Whether you are planning an entire curriculum, a semester-long course, or a single class session, the basic processes remain the same. Accordingly, in this chapter we will discuss in depth the process of writing a class session plan, as well as the process of writing a syllabus for an entire course. Finally, we will pull it all together and offer suggestions for planning for the first day of class.

Defining Objectives

The most effective plans are built around the objectives that you wish to achieve, which means that the first step in any kind of planning is clarifying and articulating those objectives. This may seem simple, but looks can be deceiving. Vague objectives such as "to help the students understand human biology" or "to teach them to write an effective argument" can get you started, but they give little focus to what you or your students will actually be doing. How, for example, will you know whether or not the students "understand"? What will you do to bring about that understanding? Similarly, how will you judge the "effectiveness" of their arguments? And if they are not effective, what will you do?

Once you have articulated in general terms what you expect students to achieve as a result of taking the course, you need to determine what intermediate steps will lead to the broader goals. What will you do to help students progress towards these goals? What specific skills will students need to acquire along the way? If your goal, for example, is for students to write an effective argument, you might break down the writing process into separate stages (e.g., defining a topic, generating a thesis, making a plan, collecting data, and choosing a design). Obviously, these stages do not always follow a neat sequence in actual writing—they often overlap, repeat, loop back, or occur simultaneously. However, by making each of them a preliminary objective for the course, you can help students see the structure of a complex process and lead them through the development of writing skills.

While you are refining your objectives in this way, there are two principles to keep in mind. First, well-considered objectives clearly specify what students should be able to do as a result of taking your course. Second, they unambiguously specify which kinds of performance will be used to determine that success. In other words, part of the planning process will be deciding what data you will use to determine whether your goals and objectives have been reached. For example, how will you know that students really understand Newton's laws? When they have memorized the equations? When they can solve an algorithmic problem? Or when they see the laws at work in everyday situations? Once your objectives are clear, planning specific classroom activities that help you and your students achieve those goals will follow naturally.

Planning a Class Session

Daily planning is essential because it gives you a clear sense of what you are trying to accomplish and how you are going to accomplish it. If you are mildly underprepared, the consequence may be excessive rigidity because you must remain within the narrow area that you are prepared to address. If you are seriously underprepared, the consequence can be sheer terror or the contempt of your students. In both cases you lack the flexibility you need to negotiate effectively between what your students know and the goals you have set for them.

Conversely, you can be overprepared. If you try to squeeze everything you know about a topic into the time constraints of one class session, you are trying to cover too much material. More important, such an effort makes it very difficult to respond to students effectively, because the teacher becomes more concerned with simply covering the material than with making sure students are learning. If you focus on what the *students* know rather than what *you* know, and if you can improvise and respond to the class while making clear progress toward defined goals—then you are prepared enough.

Being prepared also means planning not just *what* you will teach, but *how.* A session plan is not a

script you will perform for your students nor a simple outline of content to be covered. While it may include an outline, it will also include some description of the methods you will use in the session. Beyond those general principles, however, what such a plan should look like is considerably more variable. Session plans are as individual as teachers themselves. Some teachers type up exhaustive and detailed notes; others work best from a napkin. Much more thinking goes into planning a session than can ever be captured on a piece of paper. Accordingly, the following guide for class planning focuses on the process, describing the three main stages of preparing successful session plans: looking at the big picture, planning class activities that relate to course and session goals, and assessing the effectiveness of those activities in achieving objectives.[8]

Getting the Big Picture

The first step in planning a class session is to articulate your general objectives and to reflect on how these goals for the session fit into the broader objectives of the course. When getting started, you might also review the previous day's discussion and look ahead to future class sessions. If you plan each class thinking about how it relates to other material in the course, you will begin to include these links in what you present to students. This in turn will make it easier for students to see how the new ideas and materials build on what they have already learned, and how the individual session furthers the objectives of the course.

As you are planning, it is also useful to consider your students and their preparation for the material you are planning to present. Penn State students are academically diverse, so your classes may be as well. When you plan a class session, it's a good idea to reflect on the levels of prior knowledge and ability that your students have demonstrated in the course. You might, in fact, employ an anonymous background knowledge probe at the start of a new unit to gather data about your students' preparation as a whole.[9] This information can help you decide how to present the material and plan activities. For example, if the probe suggests that most of your students do not understand a concept they will need if they are to understand the new material, you might want to begin the unit by presenting this concept. On the other hand, if only a few of the students lack the prerequisite knowledge, you can ask those who need extra help to visit your office hours or a learning center. You might also consider at this point whether your students are likely to have misconceptions about the new material that will hinder their learning process. For learning to proceed smoothly, you will find it useful to address this misconception directly, possibly through a demonstration or discovery exercise at the beginning of the class. A few moments reflecting on what your students know brings focus to the rest of your planning activities.

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[8] For a more interactive guide to preparing a class, ask for the CELT publication, "Planning a Class Session."

[9] See chapter 5 for more information about using background knowledge probes and other classroom assessment techniques.

As you plan how to reach the objectives you have defined, you will also need to think about what you hope students will walk away with at the end of class. Be careful. The natural tendency is to try to cover too much in one class period. It took you far more than 50 minutes to learn what you know, and there is no reason to believe that your students will learn it any faster. While it may seem constricting, try to limit yourself to 2–3 major points per class session. Organizing all the material under these two or three focused points will help you organize the plan more effectively, and communicating this focus to your students helps them process and learn what you are teaching because they will be able to organize their thoughts around those main ideas.

Finally, it is useful to reflect on the decisions you have made about what to teach and to articulate your rationale. Obviously, if you can't find something compelling to say about the importance, significance, or utility of the material at hand, you can't expect your students to see the relevance either.

Filling in the Details

Once you have focused on a few major points and thought about what your students already know, you're ready to fill in the details of your class session plan. As you plan student activities that will further your objectives for the session and the course, you'll make decisions about the teaching methods that will work best, the types of examples to use, and the best order for the activities.

The biggest decision to make when planning a class session is which activities will facilitate learning for *your* group of students. A good rule of thumb is that lectures are an effective means for conveying information about and enthusiasm for a field, whereas problem-solving, small group work, and discussion sessions are more effective at developing new skills and changing behavior. (See chapter 2 for more discussion of matching teaching methods to objectives.) Thinking about your current objectives and your students' needs should help you choose the method or combination of methods that best conveys your two or three major points.

No matter which methods you choose to employ, you will need to plan relevant examples, illustrations, and activities that demonstrate your main points. You'll want students to make connections between the new material and their prior knowledge—knowledge already learned in the course as well as from their personal experiences—so the best activities and illustrations will take that prior knowledge into account. For the most part, it is useful to think of as many relevant examples and illustrations as possible, and then select those that will work best. For instance, making an analogy between the null hypothesis and the legal imperative of "presumed innocent until proven guilty" can greatly aid understanding among those who are new to the study of statistics, but it may not be the first illustration to come to a statistician's mind. A fair amount of brainstorming may have to occur before you will find those details that will best illustrate a concept or idea for a particular group of students.

Another thing to consider when planning an effective session is the sequence of activities and examples. You may find, as you plan, that the major points you want to make fall into a natural order—perhaps temporal or historical—that will help students master the content. There may be some kind of underlying logical structure to the examples you have chosen; for instance, perhaps you will be using a series of physical demonstrations that build on each other. Or you might think of organizing the session in terms of the teaching methods you have chosen. If you are planning to present a critical theory and then ask students to apply it to a given text, it would make sense to start the session with a lecture that explains the theory and models its application and then finish with a whole-class discussion or small-group collaborative activity during which students can apply the theory for themselves.

The precise combination of methods, examples, and sequential order in a session plan is guided by many principles, including your students, your subject matter, and the materials and classroom space available to you. How extensive and detailed your plan needs to be is largely a matter of personal choice. Again, remember that the plan is not a script; in fact, *you* are the primary audience for the plan, not your students. It represents your own process of discovery as you prepare to present new knowledge to your students through the most effective educational methods and activities.

Gauging Your Progress

One last thing to consider when planning a class session is how you will get feedback about what your students have learned—in other words, how you will find out whether or not your objectives for the day have been achieved. It's true that you can wait until the exam to discover whether your students have learned what you set out to teach, but finding out *before* the exam is a much more productive educational practice. As you finish your planning for the class session, consider gauging your class's progress through periodic checks of understanding and by establishing criteria for assessing mastery of the material.

Even within the class session itself, you can include some simple checks of understanding to see if your students have met your stated objectives for the day. Toward the end of class, you might ask them to repeat to you in discussion the two or three major points you focused on in the class session. Or you can make use of any one of several classroom assessment techniques to gauge your students' understanding of what you have taught (see chapter 5 for more details). Finding out whether or not your students have learned what you set out to teach allows you to build on the class session in future sessions, and it helps you adjust your approach if you discover that the objectives are not being met.

Another productive practice at the planning stage is articulating your criteria for evaluating the students' performance. This is a good idea because you can make sure that your session plans focus on the knowledge and skills you expect students to demonstrate when they take the exams. Working from criteria when planning class sessions helps you to maintain continuity between class activities and the

exams—and between session objectives and course objectives. In fact, one good way to prepare exams is to write questions while you are teaching the material, rather than waiting until the unit is complete to create the whole exam. If you write down a few potential questions while you work on each session plan—or, even better, after you teach each class period—you will approach the exam with a pool of relevant, reasonable questions to draw on. Again, this helps to make sure the exams really test students on the material that you have decided is important for accomplishing course objectives.

As well as providing potential exam questions, session plans can also help you plan for future classes. Many teachers leave space at the end of their session plans for comments written after class on how the session went and how they would modify the plan if they were teaching the session again. This is also a good place to note key questions from students and points that need to be reviewed at the start of the next session. According to teachers who practice this method, it simplifies revision, self-reflection, and gauging the progress of the class. These notes, in fact, can turn session plans into a resource that reaches farther than the current semester and course.

In the end, you will want to find the format for a class session plan that works best for you. What is crucial, however, is that you do write some kind of lesson plan that provides sufficient guidance for what you will do in the classroom, keeping the objectives of the course in view.

The Syllabus

In some ways, the syllabus is simply a session plan on a larger scale. However, because it plans an entire course, not a single class period, it is a more complicated task. Constructing an effective syllabus can be difficult and thus frequently is not expected of those who are just beginning to teach. Often, new teachers are given an established syllabus to follow, and even experienced teachers generally find it useful to use previous syllabi as guides when they are teaching a course for the first time. Whether you are using an assigned syllabus, referring to other sample syllabi, or writing one from scratch, the following guidelines will be helpful.

Your preparation activities in planning an entire course will follow the same basic process as preparing a session plan. Consequently, the guidelines in the previous section can be used to help you write the syllabus. Again, you will start by defining your goals. What do you want students to leave the course with? What will they know? Be able to do? Why? Equally important, what do they already know? What skills, knowledge, misconceptions do they bring with them to this course? Taking these considerations into account, what teaching methods will most effectively accomplish your objectives? And finally, how will you assess students' progress toward these goals? The act of answering these questions and writing the syllabus will help you focus your goals and articulate your vision of the course.

This fulfills the first purpose of a syllabus—to communicate the course objectives. A good syllabus is more than a schedule of assignments; it gives students a clear overview of the course and its purposes, requirements, and goals. For the most part, students come into your class with limited understanding of the external relevance and the internal coherence of the subject matter. If students are to learn effectively, they need to see the overall plan of the course and understand how individual lessons and topics fit into that plan. Therefore, a syllabus should give them an idea of where the course is going, how it's going to get there, and why.

The syllabus also serves a second purpose—it gives students basic information they need to know about the course, including its policies. Many Penn State students change their schedules during the first week of the semester, so some of your students may miss the first day of class. Even those who attend may forget much of what you say in the first class session. You would be surprised how many students do not know their teacher's name, even by midsemester, simply because they missed or came late to the first day of class. Likewise, a student shouldn't find out after 12 weeks that you have an attendance policy. You can prevent confusion or problems later in the semester by presenting all your course policies and information in writing from the start.

Balancing all of the necessary information and maintaining clarity and enthusiasm on the syllabus can be challenging, especially for beginning teachers. Thus, in addition to the general guidelines for planning in the first half of this chapter, we have provided some special considerations for writing a syllabus. In appendix B, you will find a syllabus checklist developed by participants in CELT's Course in College Teaching. As you begin constructing your syllabus, remember that the University Faculty Senate requires that students be provided with the following information during the first ten days of class: the examination procedures and grading policy, the academic integrity policy, and the evening exam schedule for daytime courses. Beyond these basic requirements, however, you have many decisions to make about what your syllabus will include. While no syllabus needs to cover every item on the list in appendix B, these ideas can help you get started.

And as you develop your syllabus, you may decide to include additional information that is specific to your course. For example, you can suggest optional readings for students who wish to pursue the topic of the course in greater depth, or background readings for those who may need extra preparation to succeed. You might list study questions for students to consider while completing each reading. Such questions help students focus on the relevant parts of the text, and encourage students to prepare for class more completely. Or you might include a section on your beliefs about the teacher's and students' roles in the teaching and learning process, an explanation of the sequence of course materials, or a rationale for course content. We have included some sample syllabi from Penn State teachers in appendix B (and many are available on the Web), but you may think of other ideas that are appropriate for your own class. [10]

As you write your syllabus, keep your audience in mind. Too much information on the syllabus can be as frustrating as not enough: if your students are faced with several pages of single-spaced text, they may never read the whole thing. You can combat this problem in several ways. First, focus the syllabus on the important points that students really need to know at the beginning of the semester, not on smaller points that might be treated more successfully later on in the course. Selecting the information carefully will also keep the syllabus at a manageable length. You might then use formatting to highlight the most important information on the syllabus. For example, headings, bullets, and separate sections can guide students to the information you consider most important. Some teachers extend the use of effective formatting by putting their syllabi on the World Wide Web. Using a class homepage, a teacher can link the sections of the syllabus to an outline, making it simple for students to access information, and for the teacher to update the syllabus as the need arises. Whether or not they use an electronic syllabus, some teachers make sure students do read the syllabus by asking them to respond to it via a brief written survey on the second day of class.

Finally, some refer to the syllabus as a "contract," but this legalistic definition is misleading and could cause problems. A syllabus is an agreement of sorts between you and your students. On it, you articulate your policies and goals for the course, and students base their expectations for the course on the information you provide. But it is also an agreement that is subject to at least minor revisions. The course plan you outline at the beginning of the semester may need to be changed to accommodate circumstances that arise later on; you may decide to shift assignment schedules, or you may find you need to add or drop readings in response to student interests and knowledge, the physical constraints of the classroom, or even the physical constraints of central Pennsylvania blizzards. Such flexibility benefits both you and the students. You can make this clear to the students from the very first by marking your syllabus as "tentative." And when events do call for a change to your syllabus, provide your students with a revised syllabus and a discussion in class of the reasons for making the change. If you start with a syllabus that communicates the important information about the course, and are flexible about the schedule when circumstances require, your syllabus can be a valuable resource for you and your students throughout the semester.

The First Day of Class

The time you spend writing your syllabus and planning your class will help prepare you for that crucial first day of class. Many teachers, whether they have been teaching for decades or are just starting out, approach the first day of class with excitement, anxiety, and questions about the coming semester: *Will my students be alert and attentive? Will they ask me questions I can't answer? Have I prepared enough material? Will I be able to motivate them to do their best work in this course?* Such concerns are

[10] You can access several online syllabi through links at the CELT Web site (*http://www.psu.edu/idp_celt*).

natural. After all, the first day of class is a social introduction of sorts and sets the tone for the rest of the semester. Thus, it is charged with all the burdens of any new situation.

There are no guaranteed procedures that will prevent first-day jitters, but a detailed plan for the first class period can help alleviate much of the anxiety and help you focus on communicating effectively with students. The threat of the unknown is diminished when you have a clear plan and prepare yourself with all the necessary information. Within reason, the more information about your course you gather ahead of time, the more confident you will be on the first day of class. For example, if you are teaching a particular course for the first time, talk with other teachers who have taught the course. Their experience is your best early source of information about the course, its history, and the expectations and level of expertise of the students who typically take the course. Other teachers can also warn you of potential pitfalls. If you have some understanding of the course and its history before you begin to teach, you are less likely to be disarmed by sudden and often disruptive discoveries about who your students are and what they know.

Another way to eliminate the unknown is to visit the classroom in which you will be teaching before the first day. Is it adequate? Does it have enough seats? Can you arrange them to suit the teaching method you will be using most often? If not, what can you do to improvise? Stand back and look at the board. Is there a glare? Do you need to pull the blinds before you use the board? If you plan to use overheads or a slide projector, is all the necessary equipment in the classroom? Will you need a microphone in this classroom? The students will expect you to provide a productive work environment, and being in control of the classroom will help. Simply being familiar with the room when you walk in on the first day can have a calming effect.

Similarly, before the semester begins, find out where the books for the course are being sold and roughly how much they cost. You will want to know if an order has been delayed, if there are enough books, and whether or not any of these conditions will affect your ability to follow your plans for the course. This advice also applies to books placed on reserve at the library. If materials are on reserve, be prepared to provide students with all the information they will need to find them, perhaps by listing call numbers on the syllabus. Likewise, if computer material is to be presented in the course, attend a session on using the classroom equipment, passwords, codes, and projectors, and learn to add software to the computers in campus labs. Preparing before the course begins allows you to establish a comfortable learning environment from the first day and to set a positive and productive tone for the rest of the semester.[11]

On the first day of class, many teachers like to arrive early so they can greet students as they come in. When class starts, introduce yourself and your background; then get acquainted with the class. When you introduce yourself, be sure to give your name, office hours, phone number, e-mail address, office location, and mailbox location. Also, mention the name of the course, the course number, and section

number. Even if all of this information is already on the syllabus, writing it on the board is a good idea. Because some students will probably be late to the first day of class, and some may have stumbled into your class by mistake, a written announcement such as this can prevent embarrassment for everyone.

In addition to introducing yourself, find out who your students are. If the class is relatively small, you might ask students to introduce themselves to the class and tell where they're from, what they are studying, and other pertinent demographics. In larger classes, you can have students take a few minutes to write this information on three-by-five cards. When you collect the cards, you send a message to your students that who they are is important, a message that can go a long way toward creating a friendly classroom atmosphere. Some teachers send this same message by having students wear nametags or by starting to learn their students' names on the first day. There are many ways to engage students, even in large classes, and this engagement is crucial. Establishing rapport with your students early on helps to encourage active participation—and active learning—throughout the semester.

To complete these introductions, give your students a brief overview of the course, your expectations, and the kind of work that will be involved. Many teachers find it convenient to convey this information when they hand out the course policies and syllabus. Talk about what you hope will be accomplished in each set of readings or assignments. Prepare a brief demonstration of the kinds of problems or activities students will encounter during the course. In short, use the first day to demonstrate what the course will be about rather than to try to cover substantive course material. Finally, take a few minutes to hear from the students. For example, you might ask them why they are taking the course, what they expect from it, what parts of its content are familiar to them, or any other questions that seem appropriate. Getting to know your students in this way gives you some immediate feedback about who your students are and also provides you with baseline information against which you can compare any subsequent feedback. (Because getting to know your students is so important in any course, we will return to it in chapters 2 and 3.)

Even if your class is too large for you to get to know all your students personally, first-day introductions are important in setting the tone for the course. Robert Mitchell (Biology), who often teaches as many as 900 students at once in Schwab Auditorium, comments, "I always begin by telling students a bit about myself. This is especially important in large classes, where students typically have less chance to interact with the instructor. It helps them get to know you and to develop a rapport with you early in the semester." This advice does not pertain only to large classes—introducing the course and establishing common goals and expectations between the teacher and the students are good practices for all Penn State classes. And, as is clear in the following narrative written by a Penn State undergraduate, students do form impressions on the first day. Katie Armstrong describes the first day—from the student's point of view—in the type of large class Robert Mitchell teaches.

[11] See the directory in appendix F for information about the reserve room, the Center for Academic Computing (CAC) labs, and other campus resources.

From the Student's Point of View

The First Class Sets the Stage[12]

KATIE C. ARMSTRONG

Department of Environmental Resource Management
Class of 1997

The previous night, I had spent a significant amount of time scanning the campus map for the best route to the classes that I was to attend the following morning. Schwab Auditorium, check; the Forum Building, check; the Thomas Building, got it. I had a strategic plan to follow so that every aspect of the first day of my college career would go right.

I went to bed by 10:30 p.m. so as to get a good night of sleep before my big day. As I was drifting off to sleep, visions of the nightmare stories that friends had told me about attending such a large school were racing through my brain. "Big schools, why bother? You'll just be a number there." "You'll never be able to learn anything from such a big school. They teach all of their classes through television monitors because the rooms are so huge!" These notions, along with my building anxiety, made for a restless night.

My alarm clock sounded at 6:30 a.m., and I jumped out of bed because I was scared to death of oversleeping on my first day. I showered quickly, dressed, and headed downstairs for a good breakfast. I was so nervous as I descended towards the dining hall that I didn't think I'd even be able to eat. But I was set right at ease by the workers there who seemed very friendly.

I finished breakfast and hurried upstairs to grab my backpack and my campus map, which by the way is a definite indication to upperclassmen that you're a first-year student. I walked out of my dorm and into the warm air and sunshine of a pleasant August morning. The street was swarming with thousands of kids my age. I walked briskly, carrying my brand new backpack equipped with blank notebooks, sharpened pencils, a calculator, and my glasses. I was ready for anything—or so I thought.

I passed by the HUB, which was buzzing with the excitement of the first day of classes, and headed toward Schwab Auditorium. I was 20 minutes early for my 8:00 a.m. Biology 101 class. I entered the auditorium through a side entrance and stopped in the doorway to take in my new environment. A huge balcony loomed overhead, and I could see students filing onto it to take their seats. It didn't look like there were many seats left on the ground floor except for a scattered few in the first three or four rows. Since I wasn't really sure how to get up to the balcony, I took my seat in the third row of the center section. There must have been over a thousand students there. I was more nervous than ever. Talk about feeling overwhelmed! I was beginning to convince myself that this enormous enrollment for my very first class was a definite sign that I wasn't going to be anything but a number here. I thought that I'd never be able to compete grade-wise with the rest of the seemingly millions of young minds that surrounded me.

Not long after I took my seat, grabbed a pen, and opened up a blank notebook, the professor arrived. I watched as he set up for his lecture. He gathered his notes, adjusted the overhead projector, and hooked something that looked like a walkman to his belt. The auditorium slowly became silent as he began to speak. He introduced himself and the subject that he'd be teaching us. Then, he handed out the semester syllabus, which detailed the grading policy for the course along with all of the topics that would be taught before the final exam.

The walkman-like device fastened to my professor's belt proved to be a great invention. Not only did it act as a microphone, but it also recorded all of the lectures. If I was absent during the semester, I could go over to the library,

[12] Originally published in *Learning at Penn State: From the Student's Point of View* (1995), available from CELT.

> dial up my course number, and listen to the lecture at my own convenience. Later in the semester, I discovered this to be a great tool to use in reviewing for exams.
>
> Sitting in the third row of such a large class ended up being a great idea. After the first few minutes of class I had completely forgotten about the zillions of people sitting behind me and focused on what I was being taught. I paid attention and tried to take good notes.
>
> On the third or fourth day of class, I noticed that for the most part the same people sat in the same general areas each day. This made making friends and getting to know people in the class much easier. By the time the first test rolled around, the people that sat around me during class invited me to study with them. We had a great time and learned very well from each other.
>
> Now, in the spring semester of my second year, I look back on that first class as being responsible for setting the stage for my studying habits for the next four years. Because I sit close to the front of my classes and forget about the people that sit behind me, large class sizes no longer faze me. Studying with friends is also something that I've made a habit of. I seem to get much more accomplished with the help of some friendly competition. And for those days when I'm really sick, or those rare occasions when I'm just too lazy, the recorded lectures really come in handy. Looking back, I wish I hadn't worried so much about my first day of college because so far these have been the best two years of my life.

Finally, Katie Armstrong reminds us that students are nervous on the first day, too. They are curious about the class and what they will be doing this semester. You can use the first session to answer their questions and give them an idea of what is to come. And by focusing the first class session on the *students* and what they want and need to know, you can also alleviate some of your own self-consciousness about what you will be doing. In the end, the first day of class can be an exciting opportunity for both you and your students.

Therefore, even if you now think that you will be using one method exclusively, it will be useful to read this entire chapter as you prepare to teach.

In this chapter, we examine lecture, discussion, collaborative activities and problem-solving approaches, and the educational objectives for which each method is best suited.[13] In describing the methods, we discuss the ways in which they overlap and how they might be effectively combined. In addition, several experienced teachers offer good advice for teaching in general. The principles of teaching that they discuss apply to a wide range of approaches, since the ultimate goal of any method is to teach students to learn and think. In other words, despite the differences in teaching style and course content, the underlying foundations effective teachers work from—and their objectives in the classroom—are often remarkably similar.

Long considered the standard method of university teaching, the lecture has come under attack in recent decades. Its critics argue that the lecture is ineffective because it allows students to be passive and uninvolved rather than encouraging them to interact with the subject, the teacher, or the rest of the class.

II. Matching Methods to Objectives

Choosing specific teaching methods that will best achieve course and session objectives is one of the most important day-to-day decisions a teacher faces. Knowing what methods are available and what objectives each method is best suited for helps teachers make this decision more easily. Most people, when asked about teaching methods, start by identifying two main types of instruction—lecture and discussion—which in effect are on opposite ends of a continuum with many exciting possibilities in between. Collaborative and problem-solving approaches, for example, are two methods that fall along this continuum; they can be combined and integrated with lecture and discussion (as well as other teaching methods) in countless creative and effective ways.

Debates about whether discussion or lecture is the preferred method for teaching are annual occurrences in academic circles and frequently are divided along disciplinary lines. Teachers in the applied physical sciences generally lean more heavily toward the lecture format while those in the humanities and some areas of the social sciences rely more on discussion. The question of lecture versus discussion, however, is actually less an issue of discipline—or of class size—than one of purpose. When the primary objective is to supply information, the lecture format is generally more effective. Conversely, discussion teaching is better suited when goals are oriented more toward changing behavior and acquiring new skills or approaches to problems.

Because virtually all classes require both the acquisition of skills and information as well as the opportunity to apply them, you may find yourself using a combination of both formats within the same course or even within the same class period—in fact, many teachers use combined methods without realizing that they are doing so. For example, a lecture can be used to model problem-solving techniques with input from students, or it can include an interactive question-and-answer period followed by small group discussions of the new concept. Becoming more aware of teaching methods and how they might work together can make your decisions about using methods to achieve course objectives more deliberate.

Therefore, even if you now think that you will be using one method exclusively, it will be useful to read this entire chapter as you prepare to teach.

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Teaching with the Lecture Method

Long considered the sandard method of university teaching, the lecture has come under attack in recent decades. Its critics argue that the lecture is ineffective because it allows students to be passive and uninvolved rather than encouraging them to interact with the subject, the teacher, or the rest of the class. While this might be true of some lectures, it's not necessarily the rule. In reality, although the small discussion class is often held up as the ideal learning environment, the lecture method does not have to be merely a compromise between educational ideals and pragmatic necessity. Many of the qualities that make discussion classes effective—active learning, student participation, and critical thinking, for example—can also occur in a well-planned and well-run lecture class, large or small. Clearly, lecturing has its advantages: it is an efficient means of presenting a body of information and conveying enthusiasm about a field, and it is a practical option in the large classes typical of institutions like Penn State.

No matter what the size of the class, effective lectures engage students in learning. In other words, a good lecture will help students actively process the information presented and integrate that new information with their previous knowledge and understanding. This idea of an active audience runs counter to a pervasive misconception about lectures, that a lecture is a performance by the teacher. Certainly, effective lectures are sometimes dramatic, and can exploit many of the elements of public performance. Yet lecturing is not acting. Effective teaching does not depend on your ability to dazzle your students, but rather on your ability to help them learn. Unlike acting, where the audience's role is usually nonverbal, effective lecturing is a two-directional process that demands both nonverbal and verbal participation of its "audience." A lecturer needs to be constantly aware of how students are comprehending and responding, so that he or she may alter the lecture accordingly. Whereas audiences are often passive, students must by definition be active participants in the classroom activity, irrespective of the particular teaching method being employed.

[13] These approaches are just four of the most common methods in use today. Many other teaching methods are available to help students achieve course objectives, including demonstrations, role-playing, case studies, and field trips. For information on other teaching methods, or for more information on the four we discuss in this chapter, contact CELT.

Your goal in a lecture is not merely to pack in as much information as possible. Rather, a lecture, like a discussion, can demonstrate problem-solving techniques, show students how to learn, structure and add to the knowledge that they learn from other sources, and help them become independent learners. Knowledge acquired without actively engaging in and working on problems will most likely be forgotten soon after a course is over. Without such activity, the knowledge never becomes the students' own—we can rightfully say students have learned something only when they own it and use it. Because the "information" of many disciplines is constantly changing, it is more important that students learn the methods used to acquire and work with a specific set of facts than that they learn the facts themselves.

In the following reading, John Lowe shows how he incorporates problem-solving techniques into the lecture format to help students become independent learners. Lowe's approach is one that focuses on creating explanations that succeed in communicating difficult concepts to students. Although his illustrations are fairly technical—as befits his subject matter—the underlying principles of his approach have broad application. The approach Lowe uses to unpack concepts and create explanations enables students to master difficult material, and also can serve as a useful model for others.

Effective Explanations[14]

JOHN P. LOWE

Professor, Department of Chemistry
Alumni Teaching Fellow, 1993
AMOCO Foundation Award Winner, 1985

I started out as a high school teacher, but teaching reawakened my interest in chemistry. So after one year I went back to get my Ph.D., figuring I could always return to teaching if I changed my mind. I completed my graduate education in 1966, and I've been at Penn State ever since. My interest in teaching has continued, however, and has led me to become involved in many courses. I've taught at least 22 different courses at Penn State in both lecture and laboratory formats.

Today I would like to talk about lecture classes. The purpose of a lecture is not merely to convey information. In order for the lecture format to be effective, the instructor must be able to give explanations that teach students to think critically and conceptually.

Instead of just talking about effective explanations, I will show you how they work by giving you two brief examples from my chemistry courses. These sample lessons demonstrate some general principles of explanation that I will then discuss.

EXAMPLE #1

I'm going to introduce to you the concept of "group" as it applies in mathematics. To demonstrate this concept, I'll use the operations of the drill soldier—left-face (L), right-face (R), about-face (A), and remain as you are (E).

[14] Originally given as an IDP Master Teacher Seminar on March 25, 1992.

We need to consider what happens when we do two of these operations together. If, for example, we do an about-face (A) followed by a right-face (R), we end up where we would be if we just did a left-face (L), so we can write that as AR = L. This is called multiplication of the operations, although it is a bit different from the kind of multiplication we usually think of.

Once we have this procedure defined, we can look at all possible combinations of two operations and set up a "multiplication table":

Second Operation

First Operation	E	L	R	A
E	E	L	R	A
L	L	A	E	R
R	R	E	A	L
A	A	R	L	E

According to this table, if right-face (R) is followed by another right-face (R), what do I get? An about-face (A). Similarly, left-face (L) followed by right-face (R) equals stay as you are (E).

Now that we have this table, we can observe some important points about these operations:

1. All double moves can be made in a single move. It's impossible to get into a position using two operations that you can't accomplish in one. This characteristic is called closure.
2. Every operation has a corresponding mate that undoes it, just as a right-face undoes a left-face. The E, or remain as you are, indicates that R is the inverse of L. And you can see by looking at the table that every operation has an inverse because every column has an E in it. In other words, every operation has a reciprocal operation that results in no change.
3. If we have three operations, it doesn't matter which pair we multiply together first. Suppose, for example, we have LRA. We can combine the left- and right-face first or the right- and about-face: (LR)A or L(RA). Using the table, we can see that (LR) becomes E, and (RA) becomes L, so the two options reduce to EA and LL. EA is remain as you are followed by about-face, so that's the same as an about-face. LL is two left-faces, which is also an about-face. So it doesn't matter which way we reduce them because (LR)A and L(RA) both equal A. This is the associative property.

Once we have made these points, we can define what mathematicians call a group: A group is a set of elements that (1) contains the identity element, namely E, or the operation of doing nothing at all, (2) exhibits closure for multiplication, (3) contains a reciprocal for every element in the group, and (4) obeys the associative law, (AB)C=A(BC).

That's the lesson I use to explain the concept of groups to my students. Some books and lecturers will start by defining groups and then proceed to give examples. However, I have found that it's easier for a student to start with a simple, concrete example and then generalize from that. Teaching this way is analogous to taking a group of people on a hike. You first need to get everyone together at the beginning, and then you proceed together, step by step, to the destination. A concrete example drawn from experience brings everyone together at the start. When possible, I like to find examples that are downright childish just to convince students that the material and concept are not too complicated for them to understand.

This principle may seem obvious, but I'm also aware that many people try to explain things backwards by starting with the generality and working down to the specifics. This has been a problem for a long time in teaching.

Joseph Priestley, who discovered oxygen, once wrote, "The student learns first what his teacher learned last." I believe that the order in which humans make discoveries is the order in which we learn most naturally. The normal order in science is first to observe specifics and then to generalize and abstract, yet we often ask our students to begin with the abstract and then observe specifics.

Now I'd like you to consider another example.

EXAMPLE #2

In physical chemistry, we want to know what molecules do in a gas. Basically, they fly around and collide with each other. We have a formula to find the average distance a gas molecule travels between these collisions:

$$l = kT/\sqrt{2}sp$$

In other words, the average distance between collisions (l) equals a constant (k), times the temperature in absolute temperature units (T), divided by the square root of two times the fatness of the molecule (s) and the pressure (p).

In class, I leave the formula on the board and reveal the first part of the question on the overhead: Oxygen gas in a steel tank at 1 atm pressure and 300K is heated to 600K. I give them a few seconds to digest that and then uncover the rest of the question: What happens to the average distance between collisions, l? They see the T in the formula, so they first answer that l doubles. That's wrong. They puzzle about it for a few more seconds and try again. At this point their interest is very high, and I have their undivided attention.

To help them understand the question, I tell them to picture the molecules as the Keystone Cops, flying around at a certain speed and bumping into each other. Then we heat it up. The number of molecules doesn't change, and the fatness of the molecules doesn't change, but they're moving around a lot faster. It's as if you watched the same Keystone Cops movie on fast-forward. Then I ask them what's going to happen to the average distance between collisions, and they see very simply that the distance hasn't changed The molecules are traveling faster, but the length of time they're traveling between the collisions is also shorter, so the distance is the same.

After they've discovered the answer and understood the principle behind it, I try to impress on them that formulas can be misleading. They made their mistake on the first answer because instead of picturing what would happen to the molecules, they jumped immediately to the formula. So as they focused on the effect of doubling T, they forgot that increasing the temperature in a rigid container would also double the pressure.

The point of this explanation is to show students that questions like this are often better answered conceptually rather than by using formulas. If they've figured out the problem logically and understood the process involved, then they can apply the formula more proficiently. This exercise can be very powerful and fun. The key is to set up a situation where the students are surprised by the results and then to use that surprise to clarify the issue.

The key to both of these lessons is starting with the simplest example possible and then asking qualitative questions that will not tempt them to use a formula or calculation. If you don't start with a simple example or explanation, you run the risk of having definitions, formulas, and procedures obscure the underlying principles. However, if you force them to figure it out "in their heads," to picture the process and arrive at an answer intuitively, they will have a true understanding of the situation. And then, once they have mastered the basic concept, they can apply it on their own to more difficult problems, procedures, and examples. This progression from simple to complex is what makes explanations work.

You can further help students understand the basic concepts by not overwhelming them with too much information. When you cover a topic for the first time, you shouldn't include every detail or tell them all you've learned. I agree with Bob Mitchell that we have to avoid trying to include everything in our lectures. In *Killing the Spirit*, Page

Smith discusses the principle of economy in education, which says that students cannot learn all that we should like them to know. Thus, it follows that reducing an explanation to its most important concepts makes the explanation more effective.

The principles of explanation that I've discussed all focus on leading students to better critical and conceptual understanding, which should be the goal of a lecture class. Therefore, in order for our explanations to be truly effective, the examinations we give need to reinforce this understanding. In science, I see a real problem with students grasping onto formulas or anything else that will help them get the answers on the test without really understanding what you want them to understand. It's human nature.

One of my colleagues recently gave a test in which he asked two questions about ideal gases. In the first question, he gave them pressure, temperature, and number of moles, and he asked them to find the volume. Ninety percent of the class got it right. In the very next question, he asked what happens to the volume of the gas if the pressure is doubled and the temperature is cut in half. It was basically the same question, but this time only a third of the class got it right. They couldn't figure out how to plug the question into their equation. That's the problem in a nutshell. They could use the formula, but they didn't understand the concepts behind it.

The growing sophistication of modern calculators that let students simply plug numbers into equations is forcing a reappraisal of how we give examinations. I personally hope that it will lead to a decision to write exams that make it possible to forbid the use of calculators altogether, perhaps by using the type of problems I've discussed today, problems that require conceptual understanding. I think if we can do that, we'll have better tests than we do now.

As a final point, let me quote a statement that a colleague made to me last week in another context. He said, "You get what you reward." It seems to me that this gets to the heart of some of the concerns I've had in recent years. When we tell the class "this will be on the test," when we use a review session to teach for the test, when we give a test that's too easy and the class average is 85—when we do all these things, I worry. I think these practices send strong signals to students acknowledging that getting a good grade is their only concern. And we validate that attitude if we structure our courses to allow them to get good grades even if they put off studying until the last minute, even if they don't make the effort to acquire the insights and the mental pictures that come with regular study. I think we should encourage these students to become independent learners, to be able to study material from the text even if it's not covered in the lecture. By rewarding the failure to meet such standards of scholarship, we get students who make scraping by a way of life. Furthermore, we demoralize the students who want to do it right. I don't have the answers for all of these problems, but I do think these are serious questions that we all need to think about if we want to impact positively our students' lives. And we can start by designing lectures and examinations that enable students to become independent learners.

Like any teaching method, the explanations John Lowe uses to promote independent learning in his chemistry classes must be carefully planned, which involves considerably more than just creating a script to perform in front of the class. Good planning takes into consideration how best to present the material to encourage active learning. To determine his approach, Lowe draws on his experience and knowledge of how students think and understand. Because he has found that his students learn better when they start with the specific and move to the general, he lets this principle guide his lectures. Likewise, knowing that learning is hindered when students are overwhelmed by too much information, he tries to focus on the most important concepts of each explanation rather than on formulas and procedures.

There really are no hard-and-fast rules for planning good lectures, but a few general guidelines can help. Like many other teachers, Lowe has developed his own approach to the lecture format through his

experience as a teacher and a scientist. As discussed in chapter 1, it's a good idea to start with an idea of your students' prior knowledge, and establish your own objectives for the lecture in the planning stage. Think about how the objectives for the class session fit into the context of the course. By focusing on a few major points, organizing them logically, and illustrating them with examples that your students can understand, you can reveal the structure of your lecture and help your students learn. Promoting student involvement with the material presented in the lecture encourages active learning.

Finally, because teachers often have more specific questions about preparing effective lectures, in the following sections we respond briefly to questions new teachers commonly ask as they begin planning and delivering lectures.

Commonly Asked Questions about Teaching with the Lecture Method

HOW MUCH MATERIAL SHOULD I PREPARE FOR AN HOUR LECTURE?—There are two inherent characteristics of the lecture situation to keep in mind when you are preparing for class. First, you need to consider the amount of verbal information that can be squeezed into a specified amount of time. Given that an average out-loud reading rate is about 140–160 words per minute, even if you are able to read at a steady nonstop pace, the most you could read in an hour would be 15 single-spaced, typewritten pages. Obviously, this would be an absurd delivery that would have little or no meaningful result. Thus, allowing for the necessary variations in pacing, questions, and so forth that accompany a well-delivered lecture, the absolute maximum amount of information that can be packed into a 50-minute lecture could be transcribed into 10 single-spaced, typewritten pages. But far fewer pages are the norm. Depending on how detailed their notes are, effective lecturers typically have no more than 2-6 pages of single-spaced pages of notes for a 50-minute presentation.

Second, when you are preparing a lecture, it is also helpful to remember that people have a limited ability to absorb aural information, tuning in and out of the lecture every 15-20 minutes. Students cannot go back and skim through a lecture when they begin to wonder whether they have missed a critical point. And they may well have! Even the best students will miss some of what is said, and the worst will miss quite a lot. Part of the purpose of lecturing is to organize and structure the material for the student. Pattern your lectures so that major items appear no more frequently than every 15-20 minutes, and limit yourself to no more than four major items within an hour lecture. Integrating information into chunks can help students process it more easily. The rest of the time can be taken up by examples, proofs, and anecdotes that support and reinforce the major point. A good lecture contains a certain amount of redundancy, but also variety as you vary how you repeat the points you want to emphasize. Making a crucial point once or twice as an abstract principle, once as a demonstration through a concrete example, and once as summary and conclusion can add real "staying power" to a lecture. Not only does change capture attention, but

using various methods increases the chance that students will understand and remember. Do not count on a really crucial point reaching all your students at the same time. A common maxim about student recall and attention is that only a fourth of your students will be fully attentive at any given moment.

It might also help to think of structuring your lecture as if it were an essay. You want an introduction to forecast both the structure and content of the lecture. Transitions will signal when you are moving to another point and will show how the material fits together. Numerous examples will illustrate ideas in concrete terms, and a good conclusion will pull it all together and reiterate the most essential points. A good lecture differs from a good essay in many ways, but a clear and obvious structure is a necessity for both.

SHOULD I READ A LECTURE?—Although there are some occasions when it is appropriate to read a lecture—such as at professional conferences when you are addressing a group of colleagues—the classroom is not one of them. Despite appearances to the contrary, reading a lecture is not a panacea for the stage fright that inevitably befalls beginning teachers. In truth, reading a lecture effectively requires as much—or possibly more—skill than does a more spontaneous delivery. Although the lecture method can draw students in by highlighting your enthusiasm about the subject, if you read a lecture aloud this enthusiasm may be lost. Furthermore, when you read a lecture, it becomes considerably more difficult to assess your students and their reactions to what you are saying. Your ability as a teacher to assess and gather information on what students have learned—including any novel reconstructions of the material they may have made—is extremely important. If you routinely read lectures, it will be difficult for you to acquire this vital feedback. Experienced teachers often recommend thoroughly preparing for each class period, perhaps even writing out the entire lecture, but stepping away from your notes in class. Ideally, your preparation will enable you to deliver your lecture extemporaneously, using your outline to guide you.

HOW CAN I BEGIN AND END A LECTURE?—Some good, basic advice is to begin a lecture by explaining how the material fits with the previous class period or the goals of the course, thus providing students with a conceptual framework on which to hang the information that will follow. Many successful teachers begin by outlining their lecture's main points before they begin, a practice which also helps students process the material as it is presented in the lecture. While these opening strategies are indeed effective, you might also try varying the opening of your lectures. Perhaps, like John Lowe, you could begin with a visual or physical demonstration of the concept behind the topic of your lecture, and then show how more complex ideas stem from the familiar. Another strategy for engaging students in the material is to ask an interesting question or raise a current or historical problem related to the content of the lecture. You can then return that point as an example throughout the lecture. Or you might begin (or end) the class by asking students to work in pairs or groups on an in-class activity related to the topic of lecture.

At the close of the lecture, conclude the class period by summarizing the main points, restating the premise, or returning to the opening question. As was discussed earlier, one example of a truly significant point will not be enough, especially for undergraduates who are just beginning their studies in your subject area. What may seem overly repetitious to you will probably be just right for your students. At the close of the lecture, you can also lay some groundwork for the next class period. This is a good time to emphasize how the ideas you have just presented are related to one another, as well as to those presented earlier in the course and those that will be dealt with in a subsequent lecture.

HOW CAN I BE SURE THAT I REACH MY STUDENTS?—Give your students an unambiguous framework for listening to the points you want to make. Students are not blank slates upon which you can imprint verbatim what you know. Nor do they absorb information passively. Rather, they will sometimes—much to your dismay—actively interpret what they hear. They will most likely remember best those details that make the most sense given what they already know and will "edit out" those that do not. Be sure you give them enough information so that they don't edit out the most critical parts of your message. To do this, you will need to build on their prior knowledge of the topic. You may want to use a background knowledge probe or a preconception/misconception check as part of your lecture planning process.[15]

A good lecture, like a good essay, not only makes a point—it demonstrates it. Demonstration can take a far greater range of forms than is possible in writing, and which forms you use will depend on your goals and the content of your lecture. As John Lowe has suggested, starting with a simple example and building to more complex ones can help students understand the material. Another fairly common way to demonstrate a point in a lecture is to invite even very controlled audience participation. For example, you can ask a series of questions to retrieve from the students the more important details in the material you have presented thus far. As you then write the points on the board, invite the class to draw the appropriate or main conclusions, thus greatly increasing the potential for student recall of the points. Alternatively, you can model various problem-solving techniques or allow students to work on problems in groups and then share their solutions with everyone at the end of class. Good lectures don't merely convey material, they also provide the opportunity for students to work with that material.

Your approach to the presentation itself can also help reinforce the objectives of the lecture. Vary your voice and movements to punctuate your major points. Lean toward your audience and lower your voice to share a private point of view on the issue; slam the podium and exclaim when you've lulled them to sleep and a crucial point has appeared; move around the room and use your hands. You can also vary your presentation by using visual aids and technology, such as overhead slides or the World Wide Web, to

[15] These classroom assessment techniques, along with the minute paper and several others, are discussed in chapter 5, and in Thomas Angelo and K. Patricia Cross,*Classroom Assessment Techniques: A Handbook for College Teachers*, 2nd. ed. (San Francisco: Jossey-Bass, 1994).

help demonstrate your points. When you explain how a visual example relates to the content of the lecture, it can fix the point in your students' minds.

During the lecture, find ways to make sure that you are not losing the students. The most obvious way is to make eye contact and watch for the tell-tale signs of incomprehension. Another way to check on the students and break up the monotony is either to invite the students' questions or to pose specific questions, such as asking students to summarize the key ideas covered thus far or to define a previously studied term. Evaluate the lecture at the end of the class by having the students write a minute paper. This simple assessment procedure involves nothing more than asking students to respond to questions such as, "When were you most confused during the lecture?" The question you ask may change depending on who your students are and what you teach, but the kinds of data you will receive can be exceedingly valuable. Despite the disarming simplicity of this technique, using it both encourages students to reflect on what they have just heard and also provides you with immediate feedback about whether what you think you said is what they actually heard. The minute paper is but one of many techniques that can be used to determine the effectiveness of your lectures by assessing what students are and are not learning.

HOW CAN I ENCOURAGE STUDENTS TO PARTICIPATE?—Before learning can occur, students must be actively involved in the class, no matter what teaching method is used. It is often a more difficult task, however, to get students to participate in a lecture hall largely because they often feel anonymous. In both large and small lectures, teachers have discovered ways to reduce anonymity. Robert Mitchell (Biology) suggests that it is important to relate to students as individuals and as active participants. For example, he asks students to bring in current articles related to the course throughout the semester and uses their clippings to add to his lectures. But he also reminds us that even something as simple as using students' names can help encourage participation. Knowing and calling on a few students by name can have a pronounced humanizing effect on a lecture. Harry West (Civil Engineering) elaborates: "I have 80–100 students in a junior-level engineering course. What I try to do is maintain some engagement with the students because I find students in a larger section lose a sense of accountability. If they lose that sense of accountability, they aren't as attentive or they skip class and they don't learn. So I have a seating chart. While I don't take roll, I use the chart to identify students and learn their names." Good teachers seem to agree on this point. Jackson Spielvogel (History) says, "I think you can personalize any situation even in a large lecture if you're willing to be open and responsive to students and if you enjoy them."[16]

HOW CAN I IMPROVE MY LECTURES?—The most obvious way to improve your lectures is to get objective feedback about what you are presently doing. For example, asking your students for feedback on your lectures early and often can help you find out what works well and what could be improved. You can also benefit greatly by asking a respected teacher, a peer, or a neutral third party to observe your class and

[16] In Chapter 3 we offer some specific ideas for promoting active participation in larger classes.

then later talk with you about it. Alternatively, you can simply tape your own class and then listen to it later. However you do it, get as much feedback as possible—ideally from a number of different people.

HOW CAN I FACILITATE NOTE TAKING?—Students' lecture notes are more than a transcript of the class period. They are the students' method of structuring and organizing the content of the lecture. Therefore, these notes need to be reliable. Unfortunately, many students do not know how to take effective notes. Many of the lecture techniques described above can help by making the structure and connections clear. For example, emphasizing the main points of your lecture outline as you speak will help students organize the material within the main topics.

Another way teachers commonly facilitate note taking is by providing visual displays using the chalkboard, the overhead, or the computer. Visual displays of examples, illustrations, or other data help students process your lecture. Even if you display only the barest outline of the day's lecture, doing so helps students follow and retain the information you present. And unlike material conveyed verbally, visual displays will generally be copied verbatim into your students' notes. Therefore, it's best not only to monitor carefully *what* you display but also *how* you put it there. The following are a few general guidelines for effective practices when using overheads, chalkboards, or computers:

1. *Start with a clean slate.* If using the board, for example, begin by removing all the work left over from previous classes.
2. *Don't display work that you wouldn't like to find on a homework assignment or exam.* When you solve problems by hand on the overhead or the board, students use what you write as a model for their own problem-solving behavior. If you skip steps or show incomplete work, they will, too.
3. *Don't put too much information on the display.* Big blocks of single-spaced text are difficult to read and impossible to copy. A better method for delivering a large amount of text would be to put it on a handout or on a Web site.
4. *Make displays as readable as possible.* If you are writing on the board or transparency in class, print clearly. Use blue or black inks on a transparency—red and green can be difficult to see from the back of the room. Likewise, use a large, easy-to-read font and colors with high contrast on computer-generated displays. Leave plenty of space between items. When you use figures or graphics, be sure to make them large enough so that students can read them from the back of the room.
5. *Make sure displays are easily visible to all students.* Check to be sure nothing is blocking students' view of the board or screen, and ask students to move if some obstruction is unavoidable. When using transparencies or a computer, place the projector in the best position for clarity of projection—not so close to the screen that the images are too small to see from the back of the room, but not so far away as to distort the visual display.
6. *Read aloud everything you display.* If you are using prepared materials, reading aloud keeps you from scrolling through the information too quickly. And if you are writing or typing during

class, reading aloud helps you to catch any mistakes and make sure students can read what you've written.

7. *Be very conscious of pacing*. If you are using computer presentation software or prepared transparencies, be careful not to scroll through the images or change transparencies too quickly. Be sure to stop and allow students to ask questions.
8. *Focus on your students.* Look away from the screen or turn around from the chalkboard and face the students before elaborating on the information you are displaying. If they look lost or are scribbling furiously, wait a minute or two before proceeding.
9. *Control lighting carefully.* Close window blinds if there's a glare on the board. When using an overhead, avoid turning off all the lights in the classroom if possible. Leaving some lights on helps students stay alert, and lets them see to take notes. Most computer displays require lower lighting. Fortunately, many classrooms are set up to allow you to light different parts of the room separately, so check the room ahead of time to find the best combination of lights.
10. *Display new material for several minutes before removing it.* While this is a fairly simple guideline for the chalkboard, it may be more challenging to follow with overheads and computers. Some teachers find that using two or three overhead projectors is a good way to deal with the space limitations of transparencies, and that supplementing computers with other types of visual displays allows the material to stay on the screen longer.
11. *Periodically check the clarity of your visual displays by walking to the back of the room after class.* Can you easily reconstruct the points you were making from what is left on the board or screen? If the major points are unclear, try different formatting options such as underlining or putting boxes around important points for emphasis.

All visual displays can be used to facilitate note-taking. Which type you choose depends on a number of factors, including class size and your individual style as a teacher. Chalkboards provide a large work area, are always available, and allow you to be spontaneous and flexible. And if you carry your own piece of chalk, you never have to worry about equipment failure. You can also use them to facilitate student participation, either by responding to student questions on the board or by having the students themselves come up and write on the board. The drawbacks of the chalkboard are visibility and time consumption. In large classes, overhead displays are usually easier to read from the back of the room, and many teachers like being able to face their students rather than having to turn away to write on the board. Overheads also allow you to prepare transparencies beforehand, so you can spend less class time writing on the board and erasing. The danger of this efficiency is that it makes it easy to present too much material too quickly, so you need to be particularly careful about pacing when using prepared displays. But if you have, for example, a complicated graphic to display, a prepared overhead can be clearer and more efficient than a chalkboard. Computer presentation software takes it one step further and offers the possibility of showing movement in graphics, linking to the Internet, or using software packages. Some teachers also make these electronic displays available to students on the Web or via e-mail, which allows students to review them outside of class. Obviously, though, using computers requires more equipment and, hence, greater opportunity for equipment failure, so it is best to be prepared with a back-up plan.

Each form of visual display has its uses and its fans. They are all excellent tools for clarifying lectures, and can be used effectively in combination. The key is to pick the tool that you feel comfortable using and that will best accomplish your objectives for a particular class session or part of a session

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Finally, when preparing a lecture, it also helps to consider the students' perceptions of the lecture method. In the following essay, a Penn State undergraduate offers advice to other students on how to learn from lectures. As she points out, lectures can encourage active learning and thinking on the student's part if both student and teacher are prepared.

From the Student's Point of View

Learning from Lectures: Can It Be Done?[17]

JILL JENEEN FISHER

Department of English
Class of 1995

Believe it or not it can, except—there's always a hitch—it takes some effort on your part. Assuming that you have a good lecturer, there are some steps you can take to ensure that you will get something out of each class. First, sit in the front of the classroom. This helps you stay awake and helps eliminate any distractions. Next, exchange phone numbers with a classmate. This number can come in handy throughout the semester, especially if you miss a class and need to get the notes. Don't be afraid to ask someone for her or his number. Other students are as happy as you are to have someone to contact in case of a problem.

Now when the actual lecture begins, it's important to listen—really listen—to the professor. There is no need to scribble down every word he or she says. You'll be surprised at how much information you retain just by listening. As far as note taking goes, you should write down the main points and any examples your professor uses. Examples are key because they relate to you and they help you understand the main points. Every night (yes, every night) you should review your notes. This enables you to put the material in your own words and allows you to see if there is anything missing from your notes or if there is something you don't understand. Here is where your classmate's number comes in handy again. You can call to ask questions when the lecture material is fresh in both of your minds. Reviewing your notes takes just 15–20 minutes a night, and it can save you lots of time when studying for the exam.

If your professor is a good lecturer, he or she can relate the course material to everyday life using good examples. This helps you remember the information. I've also found that if you take what you learn in class and relay it to a friend or roommate, it usually stays locked in your memory. Unfortunately, your friends may not be willing to listen to you ramble on about your class, but by telling them a little tidbit every day you can grasp the material and remember it. If your friends are reluctant to listen to you, there is always one person who is willing to hear you out —your professor.

You do not have to have a specific question or problem in order to go see your professor. Most professors complain about lonely office hours because only a few students come to see them. When visiting your professor, you can ask questions, expand or reiterate concepts discussed in class, or discuss different examples that will help you to

[17] Originally published in *Learning at Penn State: From the Student's Point of View,* (1995), available from CELT.

> better understand the material. Don't hesitate to stop in and see your professors—they are there to help you, and you can gain a lot by going to their office hours.
>
> When it comes time to study for an exam, there are some techniques that can help you remember the material. One idea is to meet with a study group from your class. It is essential that each student in the group comes to the meeting prepared. Each should study his or her notes and review the material before the group session. Then, as a group, discuss the main points and answer any questions people might have. Discussing questions that you already know the answers to is not a waste of time because if you explain the material to someone else you may find that it also helps you remember it.
>
> If you do all of the above you will probably have no trouble taking the test. It *is* possible to learn from lectures, and you may even find them enjoyable. Remember—you can get a lot out of lectures, but first you have to put something into them.

This undergraduate's experience suggests that students can be active participants in learning by the lecture method, when the lecture is organized, clear, and illustrated with examples that students can understand and process. This is your part of the responsibility. On the other side, students must be responsible, too. Many students at Penn State, especially freshmen, do not fully understand this responsibility. You may find it helpful to have them read this essay or to share its contents with them on the first day of class.

Teaching with the Discussion Method

Like an effective lecture, an effective discussion moves toward one or two major points and has a beginning, a middle, and an end that are all controlled by the agenda for a particular session. Unlike the lecture, however, this process is not controlled by one individual's presentation. Rather, the discussion leader must walk a fine line between controlling the group and letting its members speak. The most common pitfalls in discussion teaching—all exacerbated by lack of organization and clearly defined goals—are overly long digressions, pointless arguments, or no real discussion at all. When these pitfalls are avoided, through good planning and careful execution, the discussion method is a reliable way to draw the student into interaction with the subject, the teacher, and the other students. Some specific advantages of discussion teaching are that it provides an opportunity for the members of the class to work actively with the ideas and the concepts that are being pursued, to use the resources of the group, to apply principles, and to provide continuous feedback to the instructor about what students are learning and how successfully they can apply what they learned.

Discussion sessions can be an extremely effective means of changing behavior or attitudes. Consequently, they occur frequently in instructional situations in which the goal is to develop problem-solving or critical-thinking skills. Because material is transmitted more slowly via discussion than via lecture, discussion sessions are most suited to low-consensus fields. However, even in fields like mathematics, in which consensus about fundamental information is fairly high, discussion teaching can be introduced into the class

to help students apply abstract ideas, think critically about what they are learning, and provide useful feedback for the teacher.

In the following reading, John Moore addresses most of these issues—why and when to use discussion, how to make it work, and what the benefits are for both student and teacher. In particular, he describes the teacher's role in a discussion and how to keep control balanced between instructor and student. He also gives some practical ideas on how to get discussion started, how to keep it going, and what to do when it waivers. Moreover, he provides a compelling argument for the value of discussion and the benefits of enabling students to claim ownership of discoveries and knowledge, a principle that can be transferred to any class, no matter what teaching method is being used.

Teaching by Discussion: Dangers and Opportunities[18]

JOHN MOORE

Associate Professor, Departments of English and Comparative Literature
Alumni Teaching Fellow, 1994
Lindback Award Winner, 1983

My commitment to the discussion method grew from my experiences of teaching freshman English for five years as a graduate student. For the first two years my classes were awful. I knew it, and so did the kind and forgiving students who sat there watching my painful efforts. In my distress, I buttonholed everyone who seemed to be doing well and sat in on the classes of my senior colleagues, but nothing others had to say about what worked for them seemed to suit me. Eventually I learned that I had to find a method that suited my personality and skills and achieved the goal of the course as I defined it.

But what did I think was the goal of the course? And, ultimately, how did the goal of this particular course help reach the final goal of an undergraduate university education? Until I solved that problem for myself I could not figure out the overall purpose of my course and the purpose of each class session. Hence, I could not really know what were the means to reach the goal of each class meeting.

Somewhere in my third year of graduate study I began to find some answers. Not surprisingly, I concluded what many had arrived at before: the goal of education and hence of a university is to create true statements about the nature of reality. Where the natural sciences make ever better statements about the nature of the physical universe and the professional colleges continually refine the skills required to make society work, the arts and the Liberal Arts—my field—try to arrive at accurate and verifiable statements about the nature of human nature as revealed in such records as philosophy texts, historical documents, and literary works. One goal of the Liberal Arts then is to increase the range of human actions we know about and find comprehensible—to diminish the frequency with which one regards the new as weird—and then to take pleasure in this variety, and to expand the number of human behaviors and points of view which we find lovable. To know reality is to love it. If understanding reality better and making ever more accurate and verifiable statements about its real nature are the goals of education, what are the best means for reaching them?

Thinking back on my undergraduate education, I can still recall the essays I wrote, most of the books I read, and, most of all, the remarks I made in class. I remember little about the lectures I heard. What stays with me are the actions

[18] Originally given as an IDP Master Teacher Seminar on October 19, 1994.

I had to perform: read that book, research that problem, say something accurate, take a stand, defend your position. Those are the moments which mattered. A wonderful Penn State student once told me that there are two types of effective teachers. Those in the first group brilliantly and clearly display their own learning. Those in the second group seek to develop the skills of their students and to foster their growth as writers and analysts. Those are not mutually exclusive categories, but they do help us get a sense of different emphases and directions. As a coach finds success in the improved play of his or her athletes, as a director finds her success in how well the actors perform the play, as a conductor seeks to make all the musicians play a particular score to the best of their individual and collective abilities, so some teachers find their success, their joy, and their sense of worth in improving the ability of others to do something better than they once did.

Once I realized that I had to find my place in this second group, I then had to figure out a way of devising a course so that it moved to those ends of increasing the abilities of the students to comprehend the books they were to read and then to relate that new knowledge to their greater comprehension of the reality they inhabited. To reach those great and sweeping goals, it was more effective to spend one entire class period trying to figure out the meaning of one line in a poem or the answer to one question i.e., why is the fourth act of *Hamlet* necessary, why does the *Odyssey* not end after Book 23, how does the image of starlings being whirled by the winter's wind explain the nature of lust in the *Inferno*. Such a sharp focus on one part of one work really yielded a better comprehension of one whole poem, or play, or long narrative than a lecture which explained it all. It also was much better if the students did most of the analysis and the figuring out. That is, the final success of a class period depends on some student arriving at an answer that the rest of the class finds satisfactory and not on my announcing Moore's approved answer. The hands-on, get down in the muck, life in the skunk-works approach to a class period which had worked best for me, the chaos of a discussion class, was what suited me best and seemed to produce the results I had hoped for. So I had my end and I had my tactic, and I generally knew my means. But, just what is a discussion? Some things which look like a discussion are not the real thing. What are those illusions of the real thing?

The first type of false discussion is that revered monster, the Socratic Method. Every Socratic dialogue I have read depends on some fool claiming that he knows something and then Socrates revealing to posterity that the hapless dunce really was far more ignorant than he or even we fully comprehend. Socrates the Modest first destroys the pretender to knowledge and then presents the real answer to the question. To employ the Socratic Method is great fun if you get to play Socrates, but I suspect that this type of academic mugging is just what every hesitant student fears most about speaking up in class. The Socratic Method violates the principle "Never put down a student comment." The Socratic Method also violates the principle that a discussion is really a search for the truth cooperatively conducted by all members of the assembled group.

The second type of apparent discussion is Information Retrieval. In this type of class period, the assembled group has been assigned a text to read and the instructor responsibly wants to make sure that the students properly understand the facts, the details of what they have read. What happened then and then what? Was it really Colonel Mustard in the library with an axe? Who was in the kitchen with Dinah? This type of oral give and take is a necessary and laudable pedagogic tactic, but information retrieval or recall on the part of the students is not what makes a discussion.

What does make a discussion is the explanation or analysis or interpretation or evaluation provided by the students and not by the instructor. The reason why one wants to have a class discussion is that one wants to participate with students in a group inquiry. If the instructor already knows the answer which the class must arrive at, then the discussion method is not suited for that class or for that material. However, if the instructor is puzzled about something or genuinely wants to know what the group thinks about some issue or problem or is willing to take the risk of trying to guide a group toward discovering the unknown answer to a real problem, then the discussion format is just perfect. Discussion then is best suited to those occasions when the answer arrived at by the group will be the answer the instructor is willing to accept. What then is a discussion? A discussion is the attempt of a group of people to find the

answer to a question or the solution to a problem by way of dialogue.

Good discussions do not just happen. They must be planned and the participants must be equipped to make a contribution. To have a good discussion there are three preconditions: First, every one assembled has read the text to be discussed. Second, every one has thought about the text in some serious way. Third, every one has made a commitment to some interpretation of that text. In other words, every one arrives ready to participate and ready to make a contribution. In seminars, I manage this by assigning several questions all of which begin with the word why. Why questions are great because they avoid the trap of being questions with a one word answer. Also, they are questions which do not yield totally factual responses. They encourage interpretation and explanation. They move the student immediately into that more abstract level of mental action. By asking the question why, we have the common goal of arriving at the most convincing explanation or interpretation available to us and we know when to stop.

I want to know the answer, and I want to find out the explanation which the students have to provide, to see them confront the problem, wrestle with it and acknowledge it as a problem which lends itself to a variety of solutions. Harvard Business School, so I hear, encourages its students to consider three different responses to every business problem. Then the students must consider three consequences to each of the three proposed solutions and that chain of causality can go on for quite a while. I want the same sense of anticipation for my students reading a Shakespeare play.

By trying to find out why they think as they do about a particular moment in a Shakespeare play, I find out some startling things, things which the sophisticated critics and scholars do not bother to talk about. Each group of new students has new questions to ask because they are coming from different backgrounds and different cultures than those of a particular generation of the professoriat. Thus, if knowing what the students are thinking about a certain work and why they are thinking in that way matters, then the discussion method is wonderful because it really keeps one in touch with the actual problems which new readers of a text are having. If class after class responds in a certain way or if class after class speaks of certain moments as important, then one is learning where the real bones of a text lie and where the real tasks for the instructor lie. In this way, students instruct the instructor. Knowing these matters, I am kept in touch with my class and I can then adjust my language and tactics to find the way to nudge them toward an explanation of their own devising which they will find satisfactory or helpful.

I mentioned earlier that I arrive in class with three questions about the three key pressure points in the work we have all read and are going to talk about. But what happens when that inquiry takes off in a wholly unexpected way? Recently I was trying to encourage a class to view *Antigone* from a perspective which up to now had worked pretty well. But this year, a bold student argued that my question flowed from a morally shameless position. My blood ran cold. How could I—who was really borrowing an idea from the critic George Steiner—have anything to say in defense of the totally corrupt Creon and suggest that Antigone ought to compromise the purity of her values just to be an agreeable good citizen or group member? Faced with this outburst of energy and brilliance I had to silently throw away my neat scheme and follow her direction. We did. The class became all caught up in this line of thought. The students basically took over, and I became a quiet presence in the class. The class worked. Best of all, I learned a lot. That is one of the dangers of discussion. The instructor in a group inquiry must be prepared to lose control of the direction in which the class is going and be prepared to travel down dark alleys with bold students.

That is a very hard thing to do. Yet, unless the instructor is willing to learn from his or her students and to let them take charge, then discussion will not work. While that moment of modesty is not always good for the ego, the benefits are enormous. You find out a lot about the students and how each is thinking and approaching the material. You find out how your material really looks to others. The students meanwhile are making a strong commitment to their version of the story or the material being read. A colleague of mine in engineering asked why I was so caught up in what is essentially bull. I see discussion as acknowledging that in the last analysis all we have is interpretations or individual versions of reality. It is one thing to know the facts, but it is another to have a convincing interpretation of those facts, one which you can persuade someone else to accept or to tolerate or at least to comprehend. For me that is very exciting

stuff, and I think that students find it exciting as well.

Since there are no pre-established answers in a discussion, the class may not always come to a neat and tidy close. If an instructor can be patient and not rush matters to a conclusion, then the students will be forced to arrive at a conclusion and to provide a convincing explanation on their own. That is quite all right. In fact, that is the whole point. If the students know that at the 74th minute you will routinely unveil the approved answer, then they will not be pressed to do the work, and they will grow to be dependent on the revelations of the guru. So, accept the fact that on some days the group search for the answer will not work out. Unlike TV shows, all things do not fit into neat time segments.

It's true that discussion is a risk. Discussion makes the center of the class period the student's explanation of the data and the questions which the class is confronting. Thus, in one sense a discussion class frequently gets less accomplished. Also, in a discussion class the instructor can lose control, and the class may well wander down aimless corridors or swerve into murky intellectual cul-de-sacs. But that is okay because as you watch all that happening you see immediately in a way a lecturer never can the analytical needs of these particular students and the ways in which a profitable analysis of this material can take place. Also, discussion classes can well become very unpleasant places because a few do tend to dominate the many and the many do retreat into passive hostility.

But while discussions do have great risks, they have some great advantages. In a discussion the mind of the individual student must confront a particular text or question and provide an explanation which others must listen to and respond to and hopefully accept. They will be doing that sort of thing for the rest of their lives, and now is a good time to learn about civil discourse with those whose ideas we deplore. In a successful discussion, the student's explanation is what counts. Here, says the student, is where I stand on this matter. I have read the evidence, I have thought about it, and here is my interpretation. I am prepared to explain why I have come to these conclusions, and I am ready to persuade you of the correctness of my point of view. The intensity and the focus demanded by those tasks bring the student very close to a literary text. The student must come to know it well on deeply personal terms in order to explain it well to others. And in coming to know it well on his or her own terms, the small details of that text and the significance of it as a whole become the personal possession of the student. It becomes Nicholas Nittany's *Hamlet* and not John Moore's *Hamlet*. When the text becomes the student's possession in this way, then the instructor, like a happy and successful matchmaker, can fade smilingly into the background. This is my *Hamlet* the student now says. I like it on my terms. I like it because I know what it has to tell me about my human nature and the nature of reality. And I will like it and I will know these things long after this course is over and I have graduated. The discussion leader as a literary matchmaker exists to create these love affairs between books and students, and ideally these intellectual romances will go on and develop without his or her further attention or interference.

So, discussion is not a lecture because a discussion does not seek to impart facts; it seeks to find an explanation for the facts and it seeks to interpret those facts. Discussion exists to aid the members of a group to determine what significance or meaning or value they wish to assign to an issue about which they were previously uncertain. Discussion gives the student a voice in finding these answers. For all the risks and inadequacies of the discussion method—the apparently wasted time, the aimlessness and chaos, the submission to the verbal bully or two, the sense of things being out of control, the concentration on the student's level of understanding—the possibility of bringing about such a happy ending as students falling in love with a range of books and ideas makes it well worth all the effort it requires. Students come to us in order to learn about the nature of the world they inhabit and their own nature as human beings. The great compliment we pay them in adopting the discussion method is to tell them that it really matters to us what they think and it is really important to us that they learn how to express their ideas and to persuade others of the value of their interpretations. If one goal of education is to learn how to make true statements of one's own about the nature of reality, then this way of running a course effectively moves us toward that end. And along the way students come to understand that the messy and unruly process found in a discussion is indeed the way in which we humans must struggle to reach

whatever truths we eventually come to hold with conviction and assurance.

Although discussions can appear to be chaotic or spontaneous, effective ones require structure and planning. In discussions, the teacher controls the questions, not the answers. Those questions shape the class session and focus the discussion. For example, John Moore chooses three main points or questions for each discussion and shapes his class around them. He allots one-third of the class period to each question and moves the class on to the next point when the time runs out for each one. At the end of the class, the students may come back to the earlier points and find consensus, or they may not. But the discussion has progressed in a structured and focused way and has explored three important points that fit into the larger context of the course. As John Moore points out, the teacher using this method must at times be willing to allow students to reset the agenda if they discover a point that is more important than the three originally chosen for the day. Like any teaching method, discussion works best if the teacher can be flexible in response to students' concerns.

As they prepare to engage in discussion teaching, most beginning teachers are well aware that getting students to talk can be problematic. When asked about their greatest fears prior to entering the classroom, many teachers articulate concerns about how to keep students talking and on task. In fact, fostering effective discussion can be extremely difficult even for experienced faculty. How authoritative and explicitly directive you are will vary according to your own individual style and your class, but underlying this sometimes overt and sometimes covert control are two major principles. First, effective discussion leaders know their students. They know which students have which skills and perspectives and will often use this information to decide whom to call on to get, or keep, the discussion moving in the appropriate direction. Second, to be truly effective, each discussion session must also work within the course as a whole, meeting class-session objectives that further the objectives of the course. One way to provide the necessary context is to assign specific tasks, such as study questions, which lay a common groundwork for the discussion and which focus the students on the goals of the course. Another method is to introduce the topic for the day at the start of class and to list the subordinate topics that will be covered, but supplying this information may not be enough. The following section responds to questions teachers raise about the common problems they encounter in discussion teaching.

Commonly Asked Questions about Teaching with Discussion

HOW CAN I CREATE A CLASSROOM ENVIRONMENT THAT ENCOURAGES DISCUSSION?—As John Moore suggests, in order for good discussion to take place, students must feel comfortable and welcome. Some simple, physical things will help. For example, a classroom with movable chairs that can be arranged in a circle can greatly aid student participation in discussion. Students are more likely to talk if they can see each other. When this is not possible, you need to be more deliberate in having students respond to one

another rather than just talking to you. Having them learn their classmates' names is one approach. It is important for them to know each other so that they feel comfortable talking in front of their peers, which may take a few weeks. In order to encourage them to learn names, Larry Spence (Political Science) uses name tags in his classes. He says, "Students don't particularly like them because it reminds them of the fourth grade, and it's embarrassing if you forget to take your name tag off after class. So I try to make it fun by making up different names for my tag each day. After a while, they begin to know each other's names, and I can call on them by name. It makes the class much more comfortable for everybody."

How you respond to student comments can also encourage discussion. Instead of giving evaluative comments like "That's good," try to repeat what students have said and connect it with the main points under discussion. Ben Kleindorfer (Business) cautions against judging student responses:

> If a student can't answer a question, I say, "Well, you must not be feeling well today" or "Maybe I didn't catch you on a good one." And I go to someone else. That's giving them an escape. There are all kinds of playful ways to do that. Also, when a student asks a question about something that two-thirds of the class knows, I think it's important to go over it anyway. For every student who asks there are generally five who were too shy or haven't been able to formulate the question themselves. A student stumbles around trying to put it into words and sometimes has a very difficult time doing it.

Similarly, one of drama professor Helen Manfull's rules of teaching is that there are no stupid questions. If your responses to student comments and questions reinforce their validity, students will be more willing to take the risk required to participate.

Another way to create a classroom climate conducive to discussion is to define the nature of a good discussion at the beginning of the semester. R. Shannon Duval (Science, Technology, and Society) begins her discussion-based courses by asking the students to generate a list of guidelines for discussions throughout the semester. On the first day of class, the students collectively list the positive and negative characteristics of class discussions and generate a list of guidelines that maximize the positive aspects of discussion classes while minimizing the negative aspects—this list makes expectations for the class discussions clear. One such list included this guideline: "Come to class prepared: do not think out loud on your classmates' time. Use the study questions and homework to prepare yourself for discussion. Be prepared to explain your positions in class." Often, this list also includes items about making points succinctly, dealing with conflict, and getting back on track after digressions. Teachers who use this method find that students who help set the agenda and the guidelines feel more comfortable contributing to the discussions for the rest of the semester.

HOW CAN I BE SURE THE STUDENTS WILL TALK AT ALL?—In large part, you control the progress of a discussion by controlling the kinds of questions you pose. Remember, the purpose of a discussion is not just to

test that students have read the book. If the goal is to get them to think critically and creatively, you need to ask questions that demand this kind of response. Asking questions with multiple rather than single answers, such as John Moore describes, is one method of encouraging participation from as many people as possible. Divergent yet focused questions remove students' fears of not getting the "right" answer. For example, instead of asking, "Why is the ending of *Wuthering Heights* a good one?" you could ask, "What are other ways in which Emily Brontë might have ended *Wuthering Heights*?" Similarly, instead of asking students simply to evaluate whether a particular house is well-designed, you might ask, "Given the financial constraints, what are the different ways you could design this house to accommodate both the occupants' need for privacy and the need for social space?" Although these questions may not seem useful because they don't call for factual information, they are extremely valuable because they force students to examine and integrate the information they have and to reach a conclusion that the facts will support. In other words, they promote critical thinking.

You can also get a discussion going and people talking by asking open-ended questions such as, "What did you think about the article you read for today?" Such a question will generally open up several avenues of inquiry to be examined during the rest of the class session. Or you might open a discussion session by saying, "I personally find problems like number 16 difficult. What difficulties did you have?" The actual structure of these open-ended and multiple-answer questions will vary somewhat depending on the task at hand, but they have several advantages. First, they decrease the odds that you will be met with silence once you have finished asking your question. Second, because they encourage multiple viewpoints, they also lessen the problem of having the brightest—or most vocal—student in the class answer and dispose of the question straight-away, thereby dismissing the problem from which you had hoped to develop a discussion. Finally, if you record these multiple responses on the board, they can provide the beginnings of further topics for discussion; students will usually participate more freely when they feel their own concerns and ideas have contributed to the agenda.

ARE THERE OTHER THINGS I CAN DO TO KEEP STUDENTS TALKING?—In addition to posing the right kinds of questions, the teacher must send clear signals about the kind of exchange that is desired. But once you pose a question that asks for real debate, you must pause long enough for someone to pick it up—not necessarily the first person who raises a hand. In fact, you may find it useful to look away from the class and count slowly to 10 before calling on anyone. Not waiting after posing a question, especially one that requires thinking and problem solving, is one of the most frequent errors beginning teachers make. Unfortunately, when you do this students quickly learn that these complex questions are merely rhetorical. Unless you allow time for them to reflect adequately on the question, students will provide the answer you have already programmed into the course. If silence follows after the first person presents an opinion, ask follow-up questions such as, "How do the rest of you feel about it?" Make it clear that the students should

listen to each other and not just to you.

Another useful practice that promotes student involvement is restating for the whole class any complex or inaudible questions or responses presented by individual students to ensure that the entire class has heard what was said. This is particularly important in a classroom where the students face the front of the room and may not be able to hear all of each other's responses. Repeating complex questions and answers also accommodates hearing-impaired students who may be taking your class. Responding to student contributions in this way allows you to refocus the discussion or take it to a level of greater depth. When a student responds to a question, pursue the topic by asking for clarification or elaboration, requiring more analysis (e.g., "What are the reasons for thinking this?" and "What is the opposition to this point?"), or refocusing the discussion ("If this is true, then what are the implications for . . .?"). Show attention yourself by building on a student's point, withholding judgment until you have several responses, or listing the multiple responses on the board and asking the students to group them. Then, when students are responding to each other's statements in the discussion, encourage them to talk directly to each other rather than only to you.

Remember, too, that despite the importance of student input, students expect the teacher to control the discussion. Like John Moore, you might begin the class with three main points you intend for the students to address that day. When it is time to move on to another of the points that you want to discuss, ask for a summary or summarize yourself before moving ahead. In addition, occasional summaries during a discussion, similar to those built into a lecture, help to structure the conclusions the class has reached and to keep them on track. When tangents develop, make the appropriate connections to the main topic or subtopics. In other words, at transition points, remind the students of your broader goals and subordinate points and what they have discussed thus far. The teacher's role in the discussion is to get it started, to set goals, to mediate, summarize, clarify, and allow all to be heard.

Another approach to getting students actively involved is to make it clear from the onset that you will call on those students who do not volunteer. However, depending on how you handle the responses they give you, simply calling on students can also have a stifling effect, especially for the more reticent members of the group. If students are off-track when you call on them, try to extract those aspects of their responses that are correct and then ask a more focused question. Never simply negate a student's response by turning to another student with exactly the same question. Rather, identify whatever is appropriate about a particular response—even if only to comment about having made an attempt to respond—and then ask for elaboration from someone else.

Some teachers keep students talking *outside* the classroom by taking advantage of technology. E-mail lists and private class newsgroups provide opportunities for continuing in-class discussions and bringing up topics that might have been skimmed or neglected in the class period. Some teachers require

students to participate in an electronic discussion forum—perhaps as part of a class participation or homework grade—while others simply offer the opportunity and encourage their students to take advantage of it. E-mail and newsgroups can serve many purposes as discussion tools: they provide a forum for student-generated discussion, quick questions and answers, and required responses to the teacher's reading questions. Like any discussion, an e-mail discussion requires certain ground rules and etiquette that should be agreed upon by all participants. When such ground rules are established, teachers often find that students who may not speak up regularly in class feel more comfortable participating in an electronic "discussion." And the informality of electronic communication options can encourage a sense of community among students that makes in-class discussions even more effective.

ARE THERE TYPES OF QUESTIONS I SHOULD AVOID USING?—With a few exceptions, no. If you do ask a question that falls flat, it might feel like the question was somehow "wrong." But before you can know whether the question you asked was the wrong one, you may need to give some thought both to the objectives you had in mind when you asked the question and also to what kind of dynamic that particular type of question establishes. For example, the question, "Does everyone see how Newton's three laws work here?" may not garner much response from your students beyond a few nods. If this question is meant rhetorically to mark a transition, to remind students of previous material, it may be appropriate. But if it is meant to summarize a discussion you have just had, you will generally get a better response by asking, "Would someone please summarize the way Newton's laws apply in this situation?" Remember, students sometimes don't respond if a question seems too obvious or easy.

The opposite case—that of asking too many questions at once—can be equally problematic but generally has a great deal more potential. It is not uncommon to hear teachers ask a string of questions such as, "What is Faulkner doing here? How does he use Addie's death? Did she have to die? What is the result of her death?" If you don't provide your students with any explanation as to why you have posed so many different questions, they may not respond simply because it's unclear which question they should answer. Generally speaking, these strings of questions occur when teachers have posed a question that they subsequently realize is beyond the reach of the class. As a result, they try to remedy the situation by posing increasingly more concrete questions one after another. While their intent is to guide the problem-solving process that students might need to solve the original question, the effect is often one of confusion. When you find yourself doing this, the simplest solution is to acknowledge any confusion that may be apparent and let your students know how each question is related to the others. Then restate the one most suitable question from the set so they know which question to answer.

The only questions you should avoid are those that effectively put down a student. For example, the questions, "Who can reword her answer the way you think I would say it?" and "Anybody so confident in his answer that he wants to put it on the board?" are unlikely to foster healthy exchanges in the classroom.

In general, however, most questions have their uses. The important thing is to determine which kind of dynamic you are really hoping to establish. Then if you don't get the response you anticipate, look at how you have framed a particular question. Often simply changing the rhetorical structure of a question will help. Nearly every question can be recast for a different effect.

HOW CAN I INCLUDE ALL STUDENTS IN THE DISCUSSION?—Sometimes a particularly vocal student can dominate a group. The student may be well-intentioned and simply eager, but you need to make sure the rest of the class doesn't begin to sit back and wait for this student to answer. Waiting before accepting any answer will encourage others to talk. In other words, there is no law that says you must call on the first student to raise a hand. You can also encourage broader participation by giving students a few moments to write down an answer before you discuss it. This practice gives shy students something to refer to and those who don't think as quickly a chance to work out an answer. Having students discuss a question in small groups also opens up the discussion to other members of the class. Chuma Mbalu Keswa (Materials Science and Engineering) finds that using small group discussions at the beginning of the semester builds a comfortable, cohesive group, making subsequent large group discussions easier. If none of these techniques work when you are trying to encourage participation, you can try talking to the vocal student. Make it clear that you appreciate participation, but ask the student privately to let others who are not as quick with answers have their turn.

WHAT SHOULD I DO IF I LOSE CONTROL OF THE DISCUSSION?—The biggest problem in discussion teaching involves something akin to digression en masse. In this situation, the entire class appears to have a goal for the discussion that bears no relation to the one you expected or stated at the beginning of the class. When this happens, it is often a good idea to listen for a while until you have some idea why they might have settled on their own set of issues rather than accepting the ones you intended. Once you have some idea of what their implicit agenda might be, try to summarize the key points that have been made. If it seems appropriate, you can then ask the group to connect their points for debate with those you originally made. If they are unable to do so, you now have valuable data that will help you plan subsequent sessions or even alter the direction of the present one. Generally speaking, when teachers have continued difficulty keeping discussions on track, it is often because the students do not have sufficient background to move in the desired direction, or they may simply be unfamiliar with the tacit rules underlying academic discussions. Because they cannot answer your questions or follow your rules, they end up answering or following their own.

Try to determine whether there is information you could have supplied them first, via a short lecture, that would have allowed the discussion to continue in a more fruitful direction. Is the topic at hand too controversial for students to deal with objectively? Are there ways you could limit it to make it less volatile? Sometimes, finding out what your students are thinking and how they will respond to a given question

is more important than momentary control. As John Moore notes, sometimes losing control of a discussion is a good thing, even if somewhat scary. If students have gone off track because they have arrived at a legitimate conclusion different from yours, go along with it. After all, a discussion is not a lecture. If you're starting with the objective that the class will arrive at its own conclusion, you have to let that happen and be willing to accept the learning experience your students offer you. Likewise, don't be afraid of conflict or insist on reaching a consensus. Opposition can be very educational. If students are disagreeing about interpretations or conclusions, and if they are supporting their arguments well, they're achieving the ultimate goals of discussion teaching. As Larry Spence (Political Science) has correctly observed, "Discussion introduces a lot of chaos into your life that you have to tolerate." However, try to reassert your authority by the end of the class, which is essentially what you accomplish when you summarize the points they have made and connect them to the original questions posed at the beginning. Your control of the class lies in your ability to make sure that everyone has a chance to contribute and also to organize and synthesize the conclusions they have reached.

HOW CAN I INCORPORATE DISCUSSION INTO A LARGER CLASS?—We tend to think of discussion in terms of graduate seminars or small classes with fewer than 25 students. However, that does not mean that discussion can't be used in larger classes, whether in the familiar form of teacher-moderated discussion, or in collaborative activities among students. John Moore, for example, teaches his large classes using discussion, calling on students for comments and responses just as he would in a smaller class. John Lowe finds that offering a participation point for any comment or question encourages many of his students in large classes to participate in discussion. Other teachers incorporate discussion in large classes by having students talk directly to each other. For example, Jackson Spielvogel (History), Rebecca Corwin (Nutrition), and other teachers have students from larger classes meet in smaller groups with student discussion leaders. Even something as simple as asking each student to turn to a neighbor and discuss a homework problem or a new idea allows students to articulate what they are learning and come up with questions to ask about the subject at hand. These are just a few of the many techniques that can give students in a large class the same kind of ownership of knowledge that is more typically thought to be possible only in smaller classes. In chapter 3 you will find more suggestions for encouraging participation in large classes.

HOW CAN I IMPROVE MY DISCUSSIONS?—One of the benefits of discussion teaching is that you get immediate feedback about its success. If your students were all engaged in healthy debate over the proper topics at the designated times, it was a good discussion. Even if you generally have good discussions in a particular group, it is often useful to determine why or how you might have changed its course. As is true of lectures, the most obvious way to improve your discussions is to get objective feedback about what you are now doing. Use midsemester feedback instruments to gather student suggestions. Ask someone to sit in on your class. Take a tape recorder to class. Get as much feedback as possible, ideally from a number

of people who will have different perspectives.

Since good discussions depend so much on student involvement, you may also improve discussions by helping your students understand their role in the class. Students learn best when they take partial responsibility for the progress of the course, so teaching them to participate in a discussion helps them make the most of your class as well as others they will take at Penn State. We asked one of our undergraduate interns, who has had lots of experience in discussion classes, what advice she would give other students about participating in discussions. Her essay is also interesting for those who teach, as it addresses the question, "What do we gain by using the discussion method?"

From the Student's Point of View

The Discussion Class[19]

MELANIE O'DONNELL

Department of English
Class of 1995

Courses at Penn State come in a variety of shapes and sizes. Beyond the lecture there is the discussion class, in which instructors ask questions and encourage their students to ask questions as well. A good discussion class is highly interactive. The goal is to learn through the analysis of different opinions. There is no "right" answer in discussion. In fact, the best "answer" is several contrasting answers to the same question or issue.

In discussion classes, students offer their understanding of the material to the group. Then other students question and analyze that information. Conflicting views arise and these are then explored. Throughout the discussion, the instructor acts as a guide, shaping the direction of the conversation, but he or she will not manipulate the discussion. The discussion class is not a series of yes or no questions asked by the instructor. It requires interaction and higher-level thinking, such as analysis. On the other hand, the discussion class is also not a forum to voice any and all opinions that pop into your mind. Each class has a learning objective, like increasing the understanding of human interaction as illuminated in a certain novel. To get the most out of discussion you must stick to the agenda, which the professor usually sets.

Since the discussion class hinges on interaction, participants must be prepared in several ways to help ensure a successful session. First, read the assignments. You have to have an idea about the theories of the creation of the universe before you can discuss whether the universe is open or closed. You may also want to do some additional reading on the discussion topic if time allows. Second, think about the subject and review any class notes before the discussion. This will help you formulate some opinions. Then, during class—listen. This is very important because many students tend to either rehearse their response or daydream while other students speak, and this makes commentary a little difficult. As you listen, hear the essence of the other students' arguments or ideas and find the weak points. This brings up another important discussion ingredient—diplomacy. Finding the weak point is an exercise intended to sharpen both your thinking and that of the other students who must defend their individual stances. The idea is not to deflate other students or make anyone feel "wrong," because *there really is no wrong response except one that is disrespectful of another person's opinion*. Some phrases that you may want to use during discussion include, "I understand your point,"

[19] Originally published in *Learning at Penn State: From the Student's Point of View,* (1995), available from CELT.

> "That's interesting," and "I hadn't seen it that way." Finally, one last tip for the discussion course—swallow your fear and share your opinions.

As Melanie O'Donnell suggests, students learn best from discussions when they are prepared to participate fully. To encourage preparation, make your expectations clear from the beginning, and explain the benefits students can gain from participating in discussions—perhaps by having them read the tips presented above. In this way, you place some of the responsibility for engendering a good discussion with the students.

Teaching with Collaborative Activities and Small Groups

Discussions of collaborative learning and its benefits have become common currency on college campuses. Proponents argue that it promotes active learning, critical thinking, conceptual understanding, long-term retention of material, and high levels of student satisfaction. It also provides opportunities for students in large classes to interact on a smaller scale, and prepares students for the "real world." Clearly, collaborative learning is another useful teaching method that can help teachers and students accomplish specific goals. However, many teachers are unclear as to what precisely is meant by "collaborative learning." Collaborative activities range from small groups of students working together for part of a class period to formal semester-long group projects, with countless variations between these two extremes. But rather than attempt to sort out the nuances of various definitions, it is perhaps more valuable to analyze their shared attributes—attributes that may already exist in your own classroom.

Underlying nearly all collaborative learning experiences is a distinctive set of assumptions about what teaching is, what learning is, and what the nature of knowledge is. Perhaps the most pivotal of these is the assumption that knowledge is created through interaction, not transferred from teacher to student. Hence, it typically—and logically—follows that instructional activity must build on students' current levels of background knowledge, experience, and understanding. It also follows that the teacher's role is to create a context in which learners can make the material their own through an active process of discovery. Effective collaborative activities promote individual learning through the group process.

Obviously, in order to meet the conditions of these assumptions, teachers must leave center stage and give up what Jane Tompkins has termed the "performance model" of teaching, wherein classroom activity focuses on showing the students how smart, knowledgeable, and well-prepared the teacher is. In collaborative classrooms, by contrast, what teachers do is by definition subordinate to what students do—interact, discuss, explore and think together. Which is not to say that collaborative teachers never lecture. They may. Nor does it mean they do not prepare. They do. But take a large enough sample of student behavior in collaborative classrooms, and it quickly becomes clear that a significant amount of class time is devoted to interaction and small group activities. Covering material becomes less important than facilitating student

mastery and performance.

Many features of what is commonly identified as collaborative learning are also features of what is just plain good teaching. Thus, it is not wholly surprising that, although many faculty make deliberate efforts to include collaborative activities, their emergence is not always the result of conscious design and rarely occurs wholesale. More often, there is a gradual infusion of such activities that is frequently accomplished without fanfare and often is the serendipitous result of other kinds of experimentation. As Claudia A. Limbert (English) comments, "I'm always amazed to learn that collaborative teaching is a fairly new idea when for me it seems to be the only way to teach." And, in fact, collaboration already exists in many Penn State classrooms as open discussion, case study analysis, interdisciplinary and mini-research projects, interactive lectures, study contracts, and team model-building in a wide array of fields as divergent as English and engineering.

Collaboration in the classroom is infinitely adaptable and, consequently, something of a chameleon. It can involve groups of almost any size working on one project together or on several individual projects. It can even be informal study groups that meet periodically, enabling students to study together and learn from each other. Perhaps the most typical form of collaborative activity is formal problem-solving groups or teams, in which students work in groups to complete extended, and often applied, projects. These projects may be used to mimic the kinds of professional collaboration students will encounter as they enter the world of work. For example, Robert Melton (Aerospace Engineering) has upper-division students in his spaceship design course work in teams over two semesters to design space craft. Swamy Anantheswaran (Food Science) has senior-level students work in groups of four to solve real-world problems in food processing, drawing on sources in industry and at Penn State. When all goes well in these kinds of formal assignments, the result is much greater than what individual members of the group could have achieved on their own.

Collaboration can also involve more subtle variations of other teaching methods. One example is the modified lecture, which gets students actively involved in solving problems while still in class and also gives an opportunity to guide student problem solving. Even in very large class sections, faculty often interject a bit of collaborative learning by having students work on a single problem with one another and then discuss their solutions with the class as a whole. Similarly, following in-class demonstrations or experiments, it is often effective to ask students to break into groups to articulate or apply what they have just heard or seen. Or, after students have read about and analyzed a specific concept, you can ask them to explicate how changes in one set of variables affect other variables. For example, "In what ways, if any, would Piaget's theory of cognitive development have been different if he had studied children from non-Western cultures in addition to his own?" Even in fields where consensus is more common, these kinds of activities build confidence and shift focus away from algorithmic attempts to get the answer and onto strategies and heuristics that underlie effective problem solving.

Preparing Effective Collaborative Activities

Collaborative activities require a lot of preparation, largely because teachers can't control the agenda as they can in a lecture. Consequently, they must actually be more facile in dealing with material than if they were just telling students what they should know.

The success of a collaborative activity also depends on the appropriateness of the task that students are asked to perform. Thus, designing an assignment or question is crucial. Ideally, it should be a task for which the collaboration is an essential part of what is being taught. For example, when students work in groups to write research papers, the teaching method is not separate from the content. They are learning not just writing, but collaborative writing, which requires a distinct set of skills.

Similarly, in a geography class, you might teach the issues of water demands in the Southwest by dividing the class into groups and asking each group to take the position of a stakeholder in the Colorado River. The groups could then be charged with the mandate to argue for their group's own enlarged water rights at the expense of others. By neglecting to call on particular groups, such as the Mexicans of Baja, you can illustrate the vagaries and biases of the policy-making process. Thus, in addition to teaching students the procedural aspects of resource planning, this activity actually models the social process of negotiation and allows students to experience it for themselves.

Those teachers at Penn State who have used collaborative learning in their classes generally recommend the following advice for planning a collaborative activity:

- Begin by analyzing
  what your students already know,
  what they can do,
  what their needs are relative to the course.
- Keep questions short and simple, unless learning to break down questions is part of the task at hand. If you must ask a long and complex question, break it into a series of smaller steps.
- Before assigning problems or questions, read them aloud to check for clarity. Ask a colleague to read and comment on them.
- Ask open-ended questions or questions with multiple answers. It is especially crucial that the questions you pose really are—in your mind—questions. That is, all genuine efforts to discover and construct an answer will be acknowledged and respected.

Preparation also involves preparing students for what they are expected to do and letting them know what they can expect to get out of the activity. Generally speaking, you probably should not assume students know how to work effectively in groups. Most don't. One young professor, who had had measurable success teaching an upper-level course, attended a national conference on collaborative learning just as he was preparing to teach an introductory course for non-majors for the first time. Still full of inspiration from

the conference and fueled by confidence from earlier successes, he entered the course and immediately asked students to work in groups to solve significant theoretical problems. Well over half of the class dropped in the first week, and those who remained grumbled loudly.

Put simply, this was a case of overestimating what students could do. The error was not in what he was trying to do, but in trying to do it too soon and too fast. As this professor discovered, students need to be prepared to perform the kind of work teachers expect from them, and that preparation involves providing guidance on how to work as a group as well as subject matter information. One common obstacle to collaboration is that students have learned in school that individual work is valued, so their idea of learning may include an underlying assumption of competition with other students. After years of acculturation, it can be difficult for students to let go of that competitive attitude and learn to think as members of a team.

Be ready to devote a certain amount of time to helping students overcome these obstacles and develop collaboration skills. For example, when using long-term groups, Robert Melton recommends that the assignments be designed so that they start simple and become progressively more difficult. In his class, the groups start with an interesting open-ended assignment that could be adapted to many different fields: groups of students are given some uncooked spaghetti, masking tape, and 30 minutes to build the tallest free-standing structure they can. This project, although not difficult, gives students the chance to see how others in their group think and work, how team members will interact, and what the group dynamics will be. In other words, to set the stage for collaboration, it is often easiest to begin by minimizing the significance of the initial problem or task. Make it just a bit silly, and students will find it more comfortable to work together rather than compete. The lesson learned is an important one: through collaboration, the whole may be greater than the sum of its parts.

In the following reading, Kathryn Plank reflects on how we measure the "success" of a collaborative activity. Her experience suggests that planning an effective collaborative activity requires a strong sense of the objectives the activity is supposed to help participants achieve.

The Process and Product of Collaborative Activities or Three Men and an Egg

KATHRYN M. PLANK

Associate Director, Center for Excellence in Learning and Teaching

Collaborative learning has always been a part of my education. I went to elementary school in the experimental days of the early 1970s, when students were placed in small groups to teach each other New Math (after all, the teachers didn't

quite understand it) and to learn phonics with the aid of the latest in classroom technology (a cassette recorder and headphones). I went to a university where most of my classes consisted of 20 students discussing everything from history to astronomy, and my graduate career was spent in small literature seminars with 12 people arguing about Emily Dickinson's use of punctuation.

So when I began teaching, I could not imagine a class that didn't include group work, discussion, and lots of interaction. I designed my courses accordingly, sometimes with great success, sometimes with disappointing failure. Through trial and error, I would learn from my mistakes, make changes for the next semester, discover new problems, and so on. However, it wasn't until I once again experienced collaborative learning as a student that I really began to reflect on and understand some of the underlying complexities of collaborative learning.

As part of a workshop on collaborative learning, I participated in a demonstration of team building activities. We were divided into groups of four, given an odd assortment of materials such as toothpicks, drinking straws, chewing gum, and an egg, and told to build an "eggship" that would protect the egg in a fall. Such activities, which may seem silly, are actually very useful, especially at the beginning of a long collaborative project, because they provide a fun and nonthreatening way for students to learn about their team members and understand group dynamics. In this case, I was grouped with three older male faculty members, who quickly gathered up all the materials and began talking to each other in language that triggered unsettling flashbacks of high school physics. My hands never came in contact with a single toothpick, and I was assigned the none-too-exciting task of naming the egg and composing a story about it. Admittedly, I had no idea of how the eggship should be built and was in fact better suited to write the story, but I bristled all the same at the apparent gender inequity (besides, I too wanted to play with the toys).

What surprised me most was my reaction to the situation. Although I've been known to dominate my fair share of discussions, I watched myself withdraw, sulk, and stubbornly refuse to name the egg—all of which went unnoticed by my male compatriots who were gleefully preoccupied with constructing what turned out to be the winning eggship.

I tell this story because it does more than highlight a few of my character flaws. After I finished stewing about the incident and kicking myself for not being more assertive, I continued to mull over what had happened and began to glean from it some fundamental principles about what we're doing when we have students work in groups.

The most obvious insight is about the intersection of diversity and collaborative learning. It's not mere coincidence that when the Center for Excellence in Learning and Teaching solicited case studies of sensitive classroom situations related to diversity, most were set in the context of collaborative learning. When we break students into groups, we also break down some of the barriers in the classroom. That is, of course, the whole point, but it also means that students are brought face to face with each other in a more direct, personal way. Whereas there may be no occasion for prejudice to arise between students sitting in a large lecture hall taking notes, it can emerge when they've had hours of contact outside of class and are forced to depend on and trust each other, to deal with each other as people. Then, differences in assumptions, in work styles, in approaches to study and to life, can become obstacles and crises. Ironically, one of the ways to deal with these problems is by using an activity like the eggship construction. Such an activity, when followed by a debriefing, can give the students in the class a chance to see and analyze the interpersonal dynamics, to confront any conflicts and voice concerns before there's a grade attached.

The men in my group were not a bunch of Archie Bunkers—they simply shared an excitement for and knowledge of construction that I did not share. They probably were completely unaware of my dissatisfaction, for their exclusion of me was more an act of omission than of commission. And yet I was excluded all the same. As I reflected on my silence, I began to wonder how a student in a like situation might feel. Before having gone through the experience myself, I might very well have told such a student (if I even noticed her distress) simply to speak up and assert herself. Now I realize that it's not that simple. The situation involved not only gender, but also lack of confidence, experience, and technical vocabulary. I was silent because I knew I didn't know as much about construction as my partners.

Whereas I would like to have tried out some of my ideas for building the spaceship, I didn't think it was fair to jeopardize the group's chances in the contest—the "grade" for this project. Instead of removing competition from the classroom, this situation compounded the pressures of competition. A male student who feels less knowledgeable than others would very likely be similarly silenced. One of the benefits of collaborative activities is that it provides an opportunity for students to work together, form a group, and share excitement. This was the experience that the men had. The flip side is that it is all too easy for those same bonds to exclude others, not only from the group but from the learning experience.

This leads me to an even more general question about collaborative activities: How do we evaluate them? Because our egg survived a 6-foot fall, our group could have been deemed successful. If it had been a real class assignment, I might even have received an "A" in eggship construction. But I learned nothing in the exercise—except how hard it sometimes is to be a student. This incident confirmed for me that collaborative learning is not just about the product, but also about process. Therefore, when we evaluate the success of small group work, we have to evaluate both product *and* process.

Our group clearly had a successful product. In contrast, another group, which was composed of four people whose knowledge of physics was no better than mine, constructed an eggship that smashed their egg on the very first drop. But instead of undermining their confidence, their lack of prior knowledge freed them to experiment, to construct a very creative ship in contrast to our somewhat predictable if effective model. They also composed a great story about the egg, worked as a group on every aspect of the activity, and generally seemed to have a jolly good time, even after their egg cracked.

So which group was in fact most successful? If we look only at the product, well then our group obviously won. But what did the activity accomplish for us? We certainly didn't learn how to work as members of a team. And we also didn't learn anything new about the subject—the men simply demonstrated knowledge they already had, and I got credit for a success I had no part in. If groups use only people's strengths and avoid their weaknesses, they may lead to a better product, but not necessarily better learning. I'm sure that the egg would have been scrambled if the eggship had been left to me, but I also think that, given the opportunity to build the ship and see it fail, I might have begun to understand the principles involved. Even better, if we as a group failed and could explore that failure together, we could possibly arrive at a solution none of us would have been capable of independently. A true evaluation of the activity would have to consider the value of such failures, the importance of collaboration, and the actual process of learning. Not an easy task, but I plan to keep the memory of this experience in mind as I plan future collaborative activities.

As Kathryn Plank's experience suggests, evaluating the success of a collaborative activity is challenging. Indeed, teachers who are planning collaborative activities for the first time often raise concerns about group assessment, group dynamics, and other topics specific to collaborative learning. In the following section, we respond to some of these questions.

Commonly Asked Questions about Teaching Collaborative Activities

HOW DO I DECIDE WHICH ASSIGNMENTS/ACTIVITIES TO MAKE COLLABORATIVE?—A good rule of thumb is that if there's no reason for an activity to be collaborative, perhaps it shouldn't be. As you contemplate making a project collaborative, consider these questions: What is the objective or goal of this assignment or activity? How will that objective be furthered by asking students to work in groups? Is this project complex and challenging enough that it would be impossible for an individual student to complete it alone? Will this

project require students to synthesize their work in true collaboration, rather than just complete work separately and turn it in together at the end? Collaborative activities, large or small, work best when they draw on the strengths of group interaction—for example, a rough draft workshop in a writing class allows each writer to receive comments from several different readers. In a more long-term collaborative project, such as an engineering senior design project, one of the objectives may be to teach students to draw on the skills and abilities of each member of a team. Engineering students, like students from nearly every discipline, need effective collaboration skills upon graduation if they are to enter the workplace successfully.

HOW DO I DIVIDE STUDENTS INTO GROUPS?—Once you have decided to use a collaborative activity, one of the first issues you'll face is the composition of the groups. How many students should be in each group? Should you let them choose their teammates, or should you arrange the groups? Should you divide them by ability level? By demographics? To get heterogeneous groups or homogenous groups? Obviously, the answer to all of these questions depends in part on your objectives for the assignment. Group size can range anywhere from two, for an informal problem-solving session in the middle of the class period, to eight, for a semester-long team assignment. In the latter case, the group is large enough that there will probably be subgroups within the group. Karl A. Smith suggests starting out with small groups so that students become accustomed to the different roles necessary for effective groups before moving to larger groups.[20] Of course, group size is largely determined by the amount of work the project requires—if the assignment only provides enough work for three people, a group of five will be bored, ineffective, and probably dissatisfied.

Whether or not you let students self-select their groups also depends on your purpose and the type of assignment. For short, informal in-class activities, asking students to turn to a neighbor or a friend may be the quickest and simplest way to divide the class. Even for more formal assignments, some instructors find that letting students form their own groups according to established criteria is a successful practice. Most teachers agree, however, that when you plan an extensive collaborative activity, such as a major class project, it is better for you to arrange the groups. Students who choose to work with friends often have a harder time with group projects than students in groups chosen by the teacher. Arranging the groups yourself allows you to draw on your knowledge of the abilities, interests, and needs of individuals to create increased opportunities for learning.

You can use a variety of criteria for selecting the groups. If you're teaching an upper-division course in the major, for example, where all students share the same background knowledge, you may simply want to make a random selection, or group students with similar areas of interest together. On the other hand, if

[20] Karl A. Smith, "Cooperative Learning: Making 'Groupwork' Work," in *Using Active Learning in College Classes: A Range of Options for Faculty*, New Directions for Teaching and Learning, no. 67, ed. Tracey Sutherland and Charles C. Bonwell (San Fancisco: Jossey-Bass, Fall 1996), 71-82. Reprints of this article, and many others on collaborative learning, are available from CELT.

the goal of the project is for groups to integrate a variety of skills, you may want to sort students so that each group has a mix of background experience, abilities, work styles, and approaches to learning. It is probably best not to group students strictly by ability level, as some diversity generally fosters increased learning among the entire group. In addition, grouping by past performance is difficult because successful collaboration requires different skills from successful individual projects; you may find that students who earn high marks on individual assignments are not the most effective group members in your class.

HOW CAN I HELP STUDENTS LEARN TO WORK IN GROUPS?—As mentioned above, your students don't necessarily know how to work in groups. After years of working independently and competitively, they may find cooperation and collaboration difficult concepts to accept in an academic setting. They are so accustomed to individual grades that it may not be obvious to them how to work together when their grade depends, in part, on the performance of other students in the class. This lack of preparation may undermine the effectiveness of your collaborative assignment and keep students from meeting the objectives of the project. For example, if each of the four students working together on a newsletter treat the project like an individual assignment rather than synthesizing their efforts, the final product will be disjointed rather than seamless. Moreover, the students in such a group are unlikely to learn how to make effective use of the experience. To prepare them to work together as a team, you might start the group project with team-building activities such as Bob Melton's spaghetti tower, followed by a debriefing or a discussion of the group dynamics that surface during the exercise. These activities help students to recognize each other's strengths and work styles, and make them more aware of the internal resources their group might draw on for a more serious project. Any in-class group activity that requires all the members of the group to work together to achieve a common goal can be used as a starting point for a discussion of group dynamics.

In helping their students learn to work as members of a team, some teachers identify separate roles within effective groups (note-taker, agenda-setter, and so on) and ask each group to divide the roles between the members. Others administer a personality instrument like the Myers-Briggs Type Inventory, followed by a session on how each personality type translates to work styles and relationships.[21] Karl A. Smith emphasizes the balance between positive interdependence—the idea that no student can succeed without the success of the rest of the group—and individual accountability within groups.[22] He encourages teachers to explain these concepts and make expectations and objectives clear from the start of the project. Kris Bosworth writes that most students have the interpersonal skills that are necessary for effective group work, but that they consider these skills social rather than academic. She suggests that

[21] Judith Miller, John Trimbur, and John M. Wilkes discuss ways to use the Myers-Briggs Type Inventory to plan collaborative activities in "Group Dynamics: Understanding Group Success and Failure in Collaborative Learning," *Collaborative Learning: Underlying Processes and Effective Techniques*, New Directions for Teaching and Learning, no. 59, ed. Kris Bosworth and Sharon J. Hamilton (San Francisco: Jossey-Bass, Fall 1994), 33-44.

[22] Karl Smith's discussion of ways to encourage the group process appears in "Cooperative Learning: Making 'Groupwork' Work."

[23] Kris Bosworth, "Developing Collaborative Skills in College Students," *Collaborative Learning: Underlying Processes and Effective Techniques*, New Directions for Teaching and Learning, no. 59, ed. Kris Bosworth and Sharon J. Hamilton (San Francisco: Jossey-Bass, Fall 1994), 25-31.

teachers identify these social skills and use modeling and other methods to help students bring their interpersonal experience explicitly into the classroom to promote collaborative learning.[23] Whatever method they use to bring students together in teams, experienced teachers agree that effective collaborative activities depend on students taking individual responsibility for their work and that of the other members of their group, and using communication and teamwork skills to maintain a productive group relationship.

HOW CAN I DEAL WITH CONFLICTS WITHIN THE GROUPS?—The first step is to realize that some conflict is perhaps inevitable—and maybe even desirable. Part of what students are learning in a group project is how to negotiate differences and deal with other people to reach a common goal. Groups sometimes become stronger as they work through the conflicts that arise with the clash of different ideas and work habits. As Miller, Trimbur, and Wilkes point out, "excessive conflict can certainly interfere with performance. Paradoxically, excessive harmony can do the same, because members of the best groups tend to be critical of one another's work or at least to tolerate an in-house critic; they tend also to impose high standards on themselves."[24] Of course, this kind of creative tension doesn't worry most teachers as much as the potential personality conflicts that sometimes cause bitter feelings and unproductive groups.

One of the best ways to deal with such conflicts is to prevent them from happening in the first place. As we have mentioned, some conflict arises out of the fact that students don't necessarily know *how* to work in groups. After years of developing individual skills in competition, students need to learn how to trust other group members, how to delegate, how to negotiate, and many other team skills. Helping students understand group dynamics can also prevent conflicts. Miller, Trimbur, and Wilkes identify personality characteristics and learning styles as two areas that shape the dynamics of the group, and encourage teachers to accommodate these differences by providing groups with ways of dealing with conflict as it arises. They argue that, although educating students about group process takes class time that might be spent on course content, spending a class period discussing group work skills can make a major difference in the success of the project. "We should teach the skills that we are grading. Thus, such a session should include a briefing on the necessity for and logistics of good communication and organization and give participants an opportunity to discuss the various kinds of talents and individual differences or preferences that different people bring to tasks."[25] They suggest activities such as small groups solving a simple puzzle and reflecting on the group process afterward, students role-playing group interaction and discussing scenarios as a class, or reading and discussing information about the characteristics of different work styles and personality types, and how to accommodate these differences.

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[23] Kris Bosworth, "Developing Collaborative Skills in College Students," *Collaborative Learning: Underlying Processes and Effective Techniques*, New Directions for Teaching and Learning, no. 59, ed. Kris Bosworth and Sharon J. Hamilton (San Francisco: Jossey-Bass, Fall 1994), 25-31

[24] Miller, Trimbur, and Wilkes, 35.

[25] Miller, Trimbur, and Wilkes, 42.

No matter how well you prepare, however, variables outside your control ensure that conflicts will sometimes occur. Keeping in touch with the progress of the groups—through periodic progress reports or team assessments, for example—allows you to identify problems within the groups as they arise. If a group is having trouble resolving a problem, you will want to decide how active a role you are willing to take to help your students handle the situation. One strategy is to invite students to your office both individually and as a group to discuss the problem and possible approaches to a solution. During these meetings, you may find that students who are unhappy have not talked to the other members of their group about their dissatisfaction. By acting as a temporary discussion facilitator among the members of the group, you help students develop skills for dealing with confrontation and encourage them to talk with each other about the problems they are having.

Sometimes, students request a change to the group membership. Most teachers experienced in collaborative approaches believe that groups should be changed only in the most extreme cases, when every other avenue for resolution has failed. When students realize that they will not be permitted to change groups easily, they feel more committed to negotiating problems within their groups. Make it clear that you expect groups to work through their differences, and they will be more likely to do so. Making changes to the groups sets the group process back to the beginning and discards the benefits that have come from early interaction—even if some of that interaction has been confrontational.

HOW DO I GRADE COLLABORATIVE WORK?—Assessment of a collaborative activity is probably the biggest challenge teachers face when using this method. Collaborative activities often have several goals—individual learning on the part of each student, the successful functioning of a team, and a collaborative product that may be measured against diverse criteria. In other words, one reason why it is difficult to evaluate collaboration is that you must examine the *process* as well as the *product* of the group's work. Usually, long-term collaborative activities finish with a product created by all of the members of the team. In such a group project, how is individual work to be evaluated? Alternatively, the group process may end with each student turning in an individual assignment to be graded. In such cases, how can a teacher assess the success of the group? No matter what kind of project the students create, evaluation works best when it takes into account both product and process.

The most obvious thing to evaluate when grading a collaborative project is the final product. In some activities, students work as a group while projects are graded individually. For example, a group of students in a landscape architecture class might work as a group to create a design for a garden in a public space on campus. Such a project would require the team to research the public's needs, the existing vegetation, and the feasibility for changes within a certain budget and time frame. The final product would include a design for the garden and a document addressing the issues researched by the students. One way to grade this project on an individual basis would be for the group to divide the work into identifiable sections and

for each member to be responsible for one section. For instance, one student would research the possibilities and limitations of the space, another would write the report, and yet another would draw the design. Instead of grading the project as a unified whole, the teacher would evaluate each section and assign individual grades to each student. This type of project can have some drawbacks, as the final product may be disjointed and uneven, and the teacher may find it difficult to evaluate each individual part for a separate grade—particularly if some students were responsible only for research rather than for writing or drawing. Another way to assign individual grades to a final product would be for the students to work as a group in the researching and planning stages, with each student then turning in his or her own design for the garden. The group would function as a common resource as the students worked on their designs, but each student would be graded on an individual "final product."

However, most long-term collaborative projects finish with each group turning in one document, design, or model that represents the collective work of the entire group—and is graded as such. In the example above, group members would work together at each level of the assignment, researching and writing together, and the final design and document would represent the work of a team rather than a group of individual workers. The teacher would then grade the design and the document as a single product, assigning the same grade for the final product to each member of the team—although individual grades might change when each student's contribution to the group process is taken into account. This type of project tends to capture the ideal of collaboration more effectively than individually graded projects because each member of the team feels responsible for every part of the assignment.

Whether the group's product is evaluated on an individual or a collective basis, however, a collaborative project is much more than the final document. Usually, one basic objective for such a project is that students learn to work as team members. How can you measure whether each student has achieved this objective? As anyone who has ever worked on a group project realizes, a successful final product does not necessarily mean that the group functioned as a team and that each member contributed equally to the work. In response to this characteristic of groups, teachers who employ collaborative activities have created several methods of evaluating group process and determining whether each student demonstrated personal accountability for the project. As is true with all other teaching methods, the best results will generally be obtained by using multiple assessments throughout the project, rather than focusing only on a single evaluation at the end.

One way of assessing the effectiveness of the groups is to monitor and observe the members' interactions as they work together. Observation gives you an understanding of the quality of each group's interaction and their progress on the assignment. This kind of observation can take place in the classroom, if groups are working together in class, or through group progress reports and updates turned in during the project. When observing in class, you can look for signs of productive group work—attentive listening,

serious discussion, and progress toward a shared goal with input from each member of the group. Another informal way some teachers observe their students in collaboration is by having the teams use e-mail to communicate progress, plans and decisions as they conduct their project, and by asking students to send copies of these procedural messages to the teacher's e-mail address. This allows the teacher to observe unobtrusively the interaction of the group. Finally, some teachers use periodical progress reports to monitor their groups. When they read the reports, they check that the group is following a work plan and making progress together toward a specific goal. Progress reports are useful because they encourage students to reflect on the effectiveness of their group throughout the project, and to articulate plans for completing the assignment. For example, many teachers ask their students to complete weekly progress reports describing the tasks that each group member has completed, outlining the tasks to be completed in the next week, and confidentially commenting on each group member's contributions. Two or three required progress reports turned in during a long-term group project can help you assess how well groups are achieving the objectives of the assignment.

Although observation can provide some insight on group effectiveness and individual performance, it works best when used in conjunction with detailed feedback from the group members themselves. Since the members of the teams are best equipped to assess their teammates' and their own contributions to the project, many teachers now include their students' voices in the final evaluation process. For example, both David Meredith (Engineering) and Larry Spence (Political Science) have reported good results from using a simple point system for evaluating individual contributions to the group. Meredith tells us that he asks each student to "allocate a fixed number of points (say twenty) among the rest of the team members. The values are averaged for each student, and form a weighting factor for the final team project score." Many teachers elaborate on this idea by asking students to complete peer assessment forms when the project is complete. These forms generally include a point system similar to the one described above, and spaces for confidential comments about the contribution of each group member. Usually, the student is asked to include a self-assessment on the form, so that the teacher may understand how the student perceives his or her own contribution to the group in relation to that of other members. Robert Melton (Aerospace Engineering) requires students to complete a form that asks about the dependability, accuracy, and value of each team member's contribution to the project. In addition, the students assign a numerical rank and qualitative assessment to the contributions of each group member—including themselves. Likewise, Kathryn Dansky (Health Policy and Administration) asks students to assign numerical scores to each team member (including themselves) in five major areas: leadership, cooperation, communication, work ethic, and quality of work.

Finally, these student assessments of group process and individual contribution can be combined with your evaluation of the team's product to determine each student's final project grade. In your calculations you will weight the two scores according to the objectives of the assignment, but in general, peer assess-

ment tends to determine from 5% to 30% of the project grade. In cases where successful group process is as important an objective as is the product, the two scores might be weighted equally. Whichever method you choose, inform the students of the grading policy at the start of the project, so that your expectations for the assignment are clear. Grading collaborative activities is always challenging, but with peer assessment, individual performance can be rewarded while each student's grade still depends largely on the success of the entire group.

IN WHAT WAYS CAN TECHNOLOGY SUPPORT THE GOALS OF COLLABORATIVE LEARNING?—Just as technology can serve the lecture and discussion methods of teaching, it can also be used as a tool to address some of the challenges presented by collaborative activities. Many of the uses of technology for group projects work well in any discipline and are simple to plan and implement. For example, assigning periodic group progress reports to be submitted by e-mail is an easy way to keep up with each group's project, and your e-mail response can be sent to each team member. E-mail also simplifies out-of-class communication within the groups since students often use it to exchange ideas and set up meetings. This idea is taken a step farther in the English department, where students writing collaboratively provide feedback on each other's writing using CommonSpace, a communication and feedback software. Because the students' comments appear in separate columns set up for each writer, this software facilitates collaborative writing by bringing together feedback from each group member onto one draft, without losing track of the source of each response. In addition, the software converts documents from different word-processing programs and operating systems, allowing drafts and feedback to be sent quickly and easily to group members as e-mail attachments. The use of e-mail progress reports and collaborative writing software also prepares graduates for their entry to the workplace, where such tools are increasingly being used to support collaboration and communication.

Other teachers have used technology by creating World Wide Web sites that serve as resources for students working on collaborative projects. One excellent example of this idea is the Engineering Design and Graphics 100 Web site, created and maintained by Dhushy Sathianathan (Engineering Design and Graphics). This award-winning site combines resources for the course's collaborative design assignments, space for the student Web sites, which are a requirement of each group project, and links to the Web sites of all the teachers of ED&G 100. As resources for design projects, Sathianathan has included an outline of the engineering design process, guidelines for the reports students will complete, and several project management and assessment tools. These tools, along with the class itself, help students identify and develop the skills needed to form an effective team. The site supports students as they learn to plan and run a productive meeting, use action plans and progress reports, and perform self-assessment to track the progress of the team. Such management tools help to address many of the challenges of collaboration, such as learning to work in groups and communicating in ways that defuse potential group conflicts. Sathianathan's site also includes assessment and evaluation forms that students use to evaluate the

contributions made by their teammates and themselves. Past and present student projects make the site as dynamic as it is helpful.[26]

The ED&G 100 site clearly shows the critical role of students in the collaborative classroom. Indeed, with or without the tools of technology, the true strength of collaborative methods is that they allow students to work together to build their individual skills. When students learn through discussion and exploration, they establish ownership of the material. Here, one of our undergraduate interns reflects on how that process of discovery has affected her as a student.

From the Student's Point of View

Learning in Groups[27]

LIZ DANZICO

Department of English
Class of 1995

"Everyone pick a partner and divide into groups." At the sound of these words, my heart skips a beat. I have always been a shy kid, sitting in the back row, prepared for class, but too terrified to participate. So at the idea of communicating with a partner in a classroom setting, I am mortified.

But I have found that once I join a small group (whether it has as few as two or as many as fifteen students), I tend to open up more. In the absence of a seemingly ominous presence looming over me and expecting the right answer, I suddenly possess the freedom of speech. After I get over the initial horror at the thought of participation, my defenses go down. I feel more inclined to think and speak freely because my mistakes do not count in front of this, a jury of my peers.

Oddly enough, we seem to learn from one another in discussion groups. There have been times when students have explained concepts to me better than my instructor could have. Sometimes other students can more easily detect the exact source of confusion. As much as I hate to admit it, I have come to enjoy small discussion groups.

Just because we engage in small group discussions does not mean that the instructor has abandoned all previous teaching methods. He or she still uses lectures, films, and other teaching aids; collaborative learning is simply another tool used to approach the subject from a different direction.

But collaborative learning is also far more effective than many of the old standbys at Penn State. As far as I have seen, it has produced nothing but positive results in the classroom. The integration of collaborative learning helps foster critical thinking and communication skills that can be used inside the classroom as well as out. From an undergraduate point of view, I hope that instructors will continue to explore different methods of teaching; collaborative learning is only one of them.

[26] The Engineering Design and Graphics site can be found at *http://www.ecsel.psu.edu/setce/EDG100/*.

[27] Originally published in *Learning at Penn State: From the Student's Point of View,* (1995), available from CELT.

Teaching with Problem-Solving Methods

For many teachers—especially in highly technical or quantitative fields—the archetypal discussion class is not an especially viable option. Yet, in many such instances, the classroom situation is focused on problem solving, which can offer most of the same benefits as discussion teaching. Like discussions, problem solving is a student-centered approach, providing students with the opportunity to participate, to use and apply knowledge, to receive immediate feedback on their understanding of the concepts, and to claim ownership of the material. Because of the fundamental similarities between these two teaching methods, much of the advice in the previous section on discussion teaching can be applied to problem-solving sessions.

The term "problem-solving methods" describes a wide variety of classroom activities, many of which also draw on elements of collaborative learning. Case studies, role playing, and problem-based learning are all considered problem-solving techniques because they require students to apply the knowledge they are learning in order to make decisions and solve problems. (We will briefly discuss these teaching methods at the end of this section.) However, the most common type of problem solving in the classroom is the session in which students apply theories and concepts to specific problems and equations. This type of session is particularly common in mathematics, sciences, statistics, engineering and many other quantitative fields, and may take place in a regular meeting of a course or in a recitation section that supplements a lecture.

It may seem that the easiest way to conduct such a problem-solving session is for the teacher to solve the problems correctly for the students on the board. Indeed, this approach can achieve moderately good results with students who have already mastered the material by helping them to reinforce learned concepts and the problem-solving process. However, for those students who are still struggling to understand the material, watching a teacher solve problems is nearly valueless. These students are unlikely to leave the class knowing how to catch and correct their own mistakes. What they need is an instructional setting comparative to the one John Moore tries to establish in his discussion classes—a setting driven more by the students' performance than by the teacher's. Namely, if problem-solving sessions can be conducted so as to allow students to show you how they thought through the problem, you are in an excellent position to guide and correct their learning. These types of problem-solving sessions are analogous to discussion teaching and result in many similar and desirable results such as deeper and more highly integrated levels of learning and critical thinking.

Of course, such a method requires that students make mistakes and learn from them. Indeed, most problem-solving methods work best when students are given the opportunity to explore the problems for themselves—both inside and outside the classroom—using the teacher's knowledge and experience as a resource. Douglas Arnold (Mathematics), for example, has developed an extensive collection of animated

computer graphics that he uses to illustrate concepts in his calculus classes. He also makes these graphics available at his class Web site so that students can revisit the concepts and review the problems covered in class. Many other teachers use similar approaches, combining in-class problem solving with out-of-class activities to promote critical thought. As students explore the concepts on their own, they become more independent learners, discovering how to ask the questions that promote their own understanding of challenging subjects. As teachers lead students through this process, they often come up with questions of their own—some of which are addressed below.

Commonly Asked Questions about Teaching with Problem-Solving Methods

HOW DO I PREPARE TO TEACH PROBLEM-SOLVING ACTIVITIES?—In some ways, problem-solving methods combine the principles of both lecture and discussion. Like a lecture, a problem-solving session provides students with the explanations and definitions they need to understand new concepts. However, like a discussion, problem solving requires students to apply these new concepts in a collective endeavor with their classmates and teacher. These similarities between problem solving and both lecture and discussion are reflected in the planning process for problem-solving activities. Preparing for problem solving, like planning a lecture, involves developing examples and illustrations that students can understand and assimilate with their prior knowledge. Likewise, planning problem-solving activities is similar to preparing for a discussion, in that the teacher sets the basic agenda for the class yet also is flexible enough to address the issues and questions brought up by the students as the session progresses.

One general suggestion for planning successful problem-solving activities is to start with an awareness of what the students know and to plan activities that build on that knowledge. In addition to beginning the course with a background knowledge probe, you may also decide to use similar checks for understanding throughout the rest of the semester, particularly as you begin a new unit that builds on prior information. Knowing what your students know helps you to draw connections between new concepts and old knowledge—and enables you to prepare to bring students to a realization of these connections through class discussions.

In addition to thinking about what your students know, it's also helpful to consider common pitfalls they might make as they learn the new material. If you know where students are likely to stumble, you can incorporate activities into your problem-solving session to help them overcome common problems. John Lowe (Chemistry) has developed a creative way to deal with common pitfalls:

> I tell the class at the beginning of the semester that I'm going to make a mistake each day, and whoever detects the mistake first and shouts "Gotcha!" gets a candy bar. This technique works so well that I always carry a spare candy bar—sometimes students will catch me making an unintentional mistake in addition to the one I've planned. I especially like to use "Gotcha!" when I've warned them about a common mistake. For example, we talk about

> solving problems and the necessity of balancing the equation in order to get the right answer. But it's very easy for students to work with an equation and not check first to see whether it's balanced. So I present a problem and then start to solve it without first balancing the equation. Some students will pick up on it, and the students who don't kick themselves because it's so obvious.

"Gotcha"—or a variation of this activity—can work in large classes as well as small ones, and it is especially effective for getting students involved with the course material. If they are listening for a mistake, students will question and weigh what they hear, comparing it with what they have already learned rather than simply writing it in their notebooks. A student who shouts "Gotcha" and then explains the mistake to the rest of the class will be able to catch that mistake in his or her own work as well.

Because problem solving works best in a student-centered classroom, you may also incorporate student participation into your session plan. For example, Diana Rhodes, a TA in Mathematics, plans her problem-solving sessions in an introductory math course around student participation. Each day, her students copy problems from their homework onto transparency sheets and several of them go to the front of the room to present their problems to the rest of the class. The students explain how they arrived at their answers, and Rhodes facilitates class discussions about the problems, their solutions, common mistakes, and special cases. Student work takes center stage while the teacher provides guidance and resources to make sense of the material. Students receive participation points for presenting their problems to the class, and the student presentations provide a starting point for discussions of both new and familiar concepts.

HOW CAN I ENCOURAGE STUDENTS TO PARTICIPATE?—Encouraging students to participate in a problem-solving session is in some ways similar to encouraging participation in a discussion, so most of the suggestions for discussion will apply to this method as well. Providing a welcome and accepting atmosphere and requiring students to prepare for class should promote participation. However, because problem-solving activities often center around getting the "right" answer in ways that discussions do not, students might feel too intimidated to contribute if they are unsure of the accuracy of their answer. To encourage student participation, make it clear that students won't be penalized or ridiculed if they answer incorrectly. In fact, wrong answers are very useful to you as a teacher because they allow you to explain common mistakes to the class. When Diana Rhodes's students present their homework on transparencies, for example, they receive participation credit whether their answer is right or wrong. When an answer is wrong, she takes the opportunity to explain the process in more depth or to ask the class questions that help them discover the correct solution. In this way, she decreases the stigma attached to giving an incorrect answer and encourages her students to participate in the session.

Another common approach to enhancing student participation in problem-solving sessions is for teachers to act only as scribes as they guide student input, much as would be done in a discussion class.

For example, the teacher simply writes down exactly what the students say as they solve the problem, thus allowing them to discover and correct their own mistakes. Such an approach must allow for real detours and dead-ends in students' problem-solving processes while also offering well-aimed advice and guidance once the conceptual pitfalls and problems have been uncovered. Consequently, this method may at first seem less productive than just working the problems for the students, because you may not be able to "cover" as many problems. But the very detours and dead-ends that may slow the pace of the class will provide you with valuable feedback about the students' comprehension. Likewise, students will understand the problem-solving process better when they have worked through these mistakes themselves rather than just seeing the correct procedure on the board.

HOW DO I KEEP THE SESSION ON TRACK?—One of the challenges to running a problem-solving session—or any session which is shaped by student questions—is how to prevent drifting away from the topic at hand. When students of differing levels of understanding are asking questions, it can be difficult to strike a good balance between bringing struggling students up to date (without boring the students who already understand) and satisfying the more advanced students (without leaving the others behind). However, there are a few ways to accommodate all your students without veering too far from your plan for the day.

Often it will help if you encourage your students to articulate what they do not understand. If students indicate that they are confused by a concept or a section of the text but cannot articulate which aspects of that concept or section confuse them, try to get them to specify explicitly what is and is not clear. By keeping the issues and topics narrowed to very specific questions, you will be less likely to lapse accidentally into unplanned lectures, and the students themselves will be more likely to stay on track. Asking students to articulate their questions has an added benefit: students become more comfortable with the specialized vocabulary of the field and may even discover the solution to their problem as they ask the question in specific terms.

Once you have addressed one student's specific question on a topic, ask for related questions from the other students before going on to a new topic. Often the remaining questions can be clustered, and it will usually be more efficient to deal with clusters of similar questions rather than take them one at a time. When a question is raised that is too detailed or threatens to take the discussion on a tangent, you can avoid counterproductive digressions by responding briefly to the question and then inviting the student who has raised it to meet with you later—either after the session or during your office hours. It is permissible to limit a discussion of a particular question but only after giving a brief explanation for why you are doing so and what the conditions are for getting the question answered more fully. For example, you might indicate that a question is dependent on complex material covered in an earlier course and offer a review session. If the questions are less complex, some teachers keep sessions on track by answering off-topic questions by e-mail or class listserv, posting global answers to individual or clustered questions so that all the students

with the same question can benefit from the response. On the other hand, if it becomes clear that a majority of the students need a change in the day's lesson to keep up with the material, be flexible enough to shift gears and provide the instruction they need during class.

HOW CAN I BE SURE STUDENTS UNDERSTAND THE CONCEPTS WE DISCUSS IN CLASS?—Certainly, there are a few obvious ways to determine whether students understand the concepts. Exams and homework test their understanding, as does class discussion. The method of acting as a scribe for in-class student work shows the teacher where students are making mistakes so that these mistakes can be addressed in class. Likewise, teachers who use an overhead projector rather than a chalkboard stand facing the class, so they can recognize when students look confused or frustrated. To extend this immediate, in-class feedback, you can use daily minute papers in which you ask students to take a moment at the end of class and write down two things: the clearest point they learned from that day's class and the biggest question they still want answered. These quick responses—often turned in anonymously—give you an excellent overview of the class's level of understanding. Diana Rhodes uses this method in her math classes and finds that the minute papers guide her preparation for the next class session—when she knows that several members of the class need more help on a given topic, she can take the first five minutes of the next session to review the point and explain it again.

Some other ideas for making sure students understand the concepts can be worked into your session plans and homework assignments. One idea is to stress the precision of the vocabulary used in your field. If students can talk about a discipline, they will feel in control of the material. Teaching them vocabulary and requiring them to use it can help you make sure they understand. To give a simple example, a math teacher could provide students cumbersome "longhand" statements such as the following: "Multiply twice the length added to twice the breadth (measured in yards) by the price of fencing per yard to find the cost of fencing a plot."[28] Asking students to "translate" such statements into mathematical language (formulas and figures) helps them to understand the logic of mathematical notation.

Another idea for making sure students understand is to ask questions that emphasize the process rather than the product of problem solving. Begin by helping students to think of problem solving as a three-part process: first, decide what to do; second, do it; and third, decide whether the answer is reasonable. Rather than giving assignments that simply ask students to fill numbers into a formula, assign problems that make them decide how to approach the problem, and then have them consider whether it was the best approach to take. You might require them to describe in writing (or in class) what they are doing in a problem and why. This method shows you how students are thinking about the problems and gives you the opportunity to suggest other approaches to the problem.[29]

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[28] Lancelot Hogben, *Mathematics for the Million: How to Master the Magic of Numbers*, Revised 4th ed. (New York: Norton, 1968), 114.

[29] Ann M. Chisko, "Developmental Math: Problem Solving and Survival," *Mathematics Teacher* 78 (1985), 595.

CAN PROBLEM-SOLVING METHODS BE USED IN LARGE CLASSES?—As John Lowe's description of effective chemistry explanations suggests, problem solving can be used in large classes. Some teachers of large classes use an overhead projector to solve problems in front of the class, with the input of the students. One of the most effective ways to use this method is to divide the transparency screen into two halves and solve the problems on one side, while writing down across from the steps the rationale behind each decision. Students call out the steps and the reasons while the teacher acts as a scribe. When students see both the problems' solutions and the reasoning behind them, they clarify their thinking and gain more deliberate control over their approach to problem solving. Another idea for large classes is to use collaborative activities in conjunction with problem solving to reduce the size of the discussions: asking students to solve problems with peers for part of the session and then having representatives from selected groups present their solutions to the rest of the class, so the whole class can discuss the process of solving the problems together.

WHAT ARE SOME OF THE OTHER PROBLEM-SOLVING METHODS AVAILABLE?—Although in this section we have mostly discussed problem-solving methods best suited to quantitative fields, several other teaching methods fall into the category of problem solving. Such activities as role playing, case studies, guided design and problem-based learning can be incorporated into almost any course or discipline.[30] These activities, like the ones discussed earlier in this section, ask students to use and apply what they are learning so that they claim a sense of ownership over the material. In role-playing, students begin with a scenario presented by the teacher and adopt roles, drawing on concepts they have learned and improvising responses to the situation presented in the group. In a philosophy class, for example, students might be assigned to play the roles of different philosophers when discussing a question of ethics. This activity would require students to draw on and integrate their knowledge of the thought of different philosophers, as well as their own study of ethics. In an architecture class, students could role play the different interest groups and university offices that are involved in the building of a new university student union building and negotiate a plan for a building that would satisfy the needs of all its potential users.

Case studies, guided design, and problem-based learning are problem-solving methods that were first developed in medical and law schools but have since become common in many other fields of study.[31] Again, learning is student-centered, and teachers function as facilitators or guides. Students usually work in groups, studying a detailed, realistic scenario that calls for a decision—in the medical school setting, the project ends with the group deciding on a diagnosis and a recommended treatment. Depending on the objectives of the assignment, groups may be provided with background information or asked to research

[30] CELT can provide you with resources on these and other problem-solving approaches to teaching, including excerpts from Barbara Gross Davis's *Tools for Teaching* and reprints of articles tnat describe how teachers put these methods to work in their classrooms. For more information on problem-based learning (PBL), contact the Schreyer Institute for Innovation in Learning.

[31] Howard S. Barrows, "Problem-Based Learning in Medicine and Beyond: A Brief Overview," *Bringing Problem-Based Learning to Higher Education: Theory and Practice*, New Directions in Teaching and Learning, no. 68, ed. LuAnn Wilkerson and Wim H. Gijselaers (San Francisco: Jossey-Bass, Winter 1996), 3-12.

this information for themselves. As a group, students study the case and explore the possible options for action. For example, in Swamy Anantheswaran's senior-level food science class, Unit Operation in Food Processing, groups of four are assigned semester-long product and process development projects, in which they study and solve current or past problems facing the food industry. In a recent semester, one such group studied the potential for small Pennsylvania grape growers to manufacture and market grape juice in addition to wine. Acting as consultants, the group researched whether the change would be feasible for small growers, located the potential consumer base for such a product, and identified the challenges that grape growers would face in this move. In identifying and researching the problem, the students contacted people in industry and made use of research done at Penn State. Finally, the students presented their recommendations as oral and written reports. The other groups in the class worked with similar open-ended, complex questions that could be answered in different ways depending on the context and the needs of the audience. Anantheswaran finds that this type of project is very effective in promoting collaborative skills as well as making individual students into more resourceful critical thinkers. Students learn how to identify problems and ask the questions that help them find viable solutions in such an activity.

Nina Fedoroff (Director, Life Sciences Consortium) has also adapted medical and business models of problem-based learning in the graduate and undergraduate courses that she teaches at Penn State. She explains that such adaptations are essential, since medical students work with well-established diagnostic principles and evidence provided by the patient's symptoms. Science students, on the other hand, must learn how to develop hypotheses and design experiments to test them. Those in medical and business professions encounter a problem and ask, "How do I solve it?"; a scientist formulates a question and asks, "How do I answer it, and how can the answer be used in developing the next question?" With undergraduates, Fedoroff likes to introduce science questions raised by current events, such as the development of controversial genetically-engineered plants or animals. She divides the class into pro and con groups and asks each to build a case based on scientific and social arguments. Her aim is to help students see how science research fits into the big picture. In more advanced courses, the questions she asks are broader in scope, forcing students to venture into the unknown. She encounters resistance to this in some students, yet it is the kind of thing they must learn to do if they want to be scientists. Overall, she has found questions to be most successful when they make students most uncomfortable. When her students come up with reasonable and well-developed experimental strategies for answering a question, Fedoroff knows that her problem-based approach is a success.

III. Teaching to Scale

What does it mean to teach at Penn State? For many faculty and students, Penn State's land-grant mission is central to defining the University's purpose. Consequently, one of the most frequent descriptions is the word "pragmatic," meaning not only the mastery of technical and utilitarian skills, but also preparing a diverse group of students for their futures as learners and citizens. A related and equally important description is "vast and complex." At a University serving over 76,000 students at 23 different locations, size and distance are key issues shaping the educational experience.

These characteristics lead to some special circumstances for teaching at Penn State. While many fundamentals of teaching are universal, their implementation varies according to context. Thus, in this chapter, we address the context for teaching at Penn State. How, for example, do you plan a class that will meet the needs of a wide range of students? How do the general principles of teaching and learning apply in a class of 300 as opposed to a class of 30? At a large research university like Penn State, what is the role of the graduate teaching assistant? And when can technology be used as a tool in the teaching/learning process?

Teaching Diverse Student Populations

One of the most exciting things about teaching at a large university is working with a diverse faculty, staff, and student body. People from all parts of the globe come to Penn State to work and study, and many who have been abroad recently tell stories about spotting Penn State caps and T-shirts where they least expected to find them. However, people at Penn State are diverse in many more ways than national origin. Much diversity can be found among undergraduates, even those who grew up in Pennsylvania. Some are veterans; some have physical disabilities; some are returning adult students; some graduated from large high schools, and some from small; some have parents who went to college, and others are first-generation college students—the list of differences is endless.

Since students in your classrooms clearly are a diverse population, it makes sense to take this diversity into account when designing courses and planning class sessions. While no one can anticipate every situation that may arise, you should begin with the assumption that students' needs will vary and, as in so many teaching situations, be prepared to modify your plans as necessary. You might, for example, include a statement in your syllabus inviting students with special needs to discuss them with you.[32] How particular teachers meet the diverse educational needs of particular students does and should vary. However, the basic practices of good teaching outlined and demonstrated in this book will help you to use students' diversity to advantage, both theirs and yours. For example, if you administer a background knowledge probe (see chapter 5), you will collect a sizable amount of information about students' educational experiences—including many of the assumptions, values, prejudices, and insights that those experiences comprise. Few teachers who make the effort to collect such information will ignore it. Most will use at least a portion of this information to create a more flexible and more interesting learning environment.

Knowing your students is, by itself, not a guarantee that you are making the most of the diversity they bring to your classrooms. A second fundamental of successful teaching—teaching that, among other things, accounts for diversity—is knowing yourself. Good teachers make self-assessment routine practice. As anyone who does research on human subjects knows, self-awareness does not come naturally to most people. It requires diligence, patience, courage, and, perhaps most important, a willingness to give up the idea that your students necessarily think like you and share your needs and assumptions. Teachers should always be asking themselves basic questions such as, "Am I treating certain students differently when they need to be treated the same?" and "Am I treating certain students the same when they need to be treated differently?" If asked consistently, these two questions can form a solid foundation for the kind of situational ethics needed to create a learning environment that will be beneficial to all students. You can afford to make mistakes, if you are willing to learn from them.

Besides knowing your students and yourself, the final missing piece essential to teaching that accounts for diversity is community. Just as you could not conduct research if isolated from other specialists in your field, so you cannot make all decisions about how to teach difficult topics or handle new situations without access to others who have had similar experiences. The more diverse this community of colleagues, the more likely the chances that you will receive challenging and useful advice on how to handle sensitive issues in the classroom. For example, if you suspect that cultural differences are affecting the way your students work together on a collaborative project, colleagues can share methods they have discovered for improving group dynamics. Whether this collegial support is formal or informal, it must be based on trust and mutual respect to be effective. Besides department colleagues, many offices at Penn

[32] A student with a disability will usually have a letter from the Office of Disability Services explaining what, if any adaptations are needed to provide the most appropriate learning environment, such as allowing extra time on exams or permitting the student to audiotape lectures.

State have consultants who can help you evaluate questions related to teaching for diversity. (See the Directory of Resources in appendix F for more information.)

Teaching Large Class Sections

If "large" is defined as 100 or more students per section, then large class sections are the exception rather than the rule at Penn State.[33] However, most undergraduates and even some graduate students will find themselves in a large section at some point in their student careers. Most undergraduates who come to University Park can expect to take one or more large classes per semester in their freshman and sophomore years.

While most teachers at Penn State will not routinely have sections with as many as 100 students, many will teach sections that feel large to them. Some instructors simply define "large" as "too many students to learn names by the end of the semester." If you find yourself teaching a larger section than you are used to, do not despair. Large classes are not necessarily less effective than smaller ones, but they do require more conscious effort and planning.

Because of the special problems scale imposes on the teaching-learning process, faculty in very different disciplines find it useful to talk with one another to share effective solutions to the often vexsome problems of large class sections.[34] These solutions are also of interest to those who do not teach large class sections. Thus, irrespective of how many students are in your sections, you may find the combined administrative experience and problem-solving skills of those who regularly teach large sections thought provoking. Accordingly, we provide some of their most innovative and effective solutions to common problems. Most of these problems involve communication within and outside the classroom. In the classroom, for example, students tend not to interact as much with the teacher and among themselves as they do in smaller sections. Other problems include taking attendance, motivating students, testing, and providing students with helpful feedback on their work. Before looking at specific problems and solutions, however, here are two inside views on large classes from a Penn State undergraduate and a veteran faculty member at University Park.

While teachers of large classes are well aware of the challenges that surround teaching several hundred students at once, it may be difficult for them to imagine what it must be like to be a student in such a class. Understanding the students' experience can help teachers find ways to teach more effectively. Rob Billingham, a recent undergraduate intern in our office, spent several days sitting in a variety of large classes at Penn State. His experiences enabled him to make an observation that had not occurred to

[33] In the fall semester of 1996, for example, over 85% of all class sections had 50 or fewer students enrolled, and two-thirds had 30 or fewer. Freshman courses (those with 0-199 course numbers) for the same semester have only slightly lower percentages. (Figures obtained from the Office of Budget and Resource Analysis in May 1997.)

[34] One forum for this kind of sharing has been CELT's series of Luncheons for Teachers of Large Class Sections. Many of the ideas and suggestions in this chapter have been gathered from these luncheon discussions.

him previously—namely, that how a teacher handles the last five minutes of class can have an impact on the entire class. The following essay captures what he saw.

From the Student's Point of View

A Student's Reflections on Five Large Class Sections

ROBERT BILLINGHAM

Department of English
Class of 1996

Scene 1: "Before everyone starts shuffling, I have five more minutes left," the professor says. The noise in the Forum gets increasingly louder as the instructor tries to finish the lecture. After conducting an experiment and discussing its implications, the professor says, nodding up at the clock on the back wall, "Wait a second, we have two minutes; I go by that clock." The class grows louder as the sounds of folders snapping and backpacks zipping carry throughout the room. A minute or so before the end of class the professor makes some final announcements as students begin filing out.

Scene 2: For most of the period the large Schwab classroom has been quiet and attentive—heads tilted to the side, pens running. Throughout the class period the professor has shown a consistent desire to have the students be clear on the matter at hand. There is a lot of information to absorb. With five minutes left, a few folders snap. One desk bangs. There is some shuffling of paper. The professor finishes up and says, "Because we're running out of time—" Desks bang, voices rise, students leave—final words are lost on much of the crowd.

Scene 3: With five minutes left in class, the students start moving papers and desks, impatient to leave the large Forum classroom. Completing a discussion on derivatives, the professor knows they're eager to go and says, "I want you all to be quiet, and don't bang chairs. I still have four minutes left." At the very back of the room there are some grumbling voices, but overall the students remain in their seats and are attentive until the end of class.

Scene 4: During the Forum class period, the students have been intermittently loud throughout the session. With five minutes left, the students are impatient. There is a rush of shuffling papers and the sounds of several desktops banging down. The professor finishes up the lecture on a scientific matter, says the three words "and next time" and the students roar from their seats and file out of the room.

Scene 5: With five minutes left, desks bang. The class is ready to go. The professor does an experiment as a thin veil of noise covers the lecture. The classic zipping of school bags is heard throughout the room. "I have to explain these last few things," the professor says, aware of students' impatience to leave. Many students get their pens going again. At the end of class, the professor is still explaining, and the class doesn't succeed in leaving the room before the lecture is complete. Upon a few words suggesting dismissal, the class files out from the room.

* * * * * *

It's the last five minutes and it's a battle between teacher and students. Two wills clash, one trying to keep control, the other resisting. The last five minutes of a large class can be a very tense time. In the above examples, it is evident that a struggle exists, one that can be very frustrating for the teacher.

What do these examples show us? Why is one group of students more attentive at the end of the session than another? There are many factors that contribute to the emotional atmosphere of a large class during the last five minutes, some of which are practically unapproachable in terms of analysis (i.e., students having a bad hair day or the depth of respect for a teacher gained over time). However, as I sat in on several class sessions in both the Forum and Schwab, two things struck me as being potentially significant. First, I noticed how the architecture of both buildings seemed to have an impact on the mood of students. This was immediately apparent since the classroom buildings are radically different in their structure and physical atmosphere. Second, I noticed the teacher may have influenced student reaction in certain ways by the use of language, giving us the drama of these classroom situations.

Reflecting on the architecture of Schwab and the Forum, I found that it had both positive and negative attributes. Whereas the Forum was bright white inside, Schwab was dark yellow. In Schwab, which feels like an old church or movie-house—rectangular, flat, spread out—the teacher was farther away, and the one front-center screen was much larger than anything at the Forum. The lighting is dim and the room is larger with a sense of grandeur about it. Great plush curtains hang down on the sides of the walls. A long balcony stretches itself around the room. The atmosphere impressed me as having an effect on the greater quiet that pervaded the large room. Both Schwab classes I observed were relatively quiet, and the lecture could be heard easily, but—and here's the tradeoff—there was hardly any student participation. Some students I interviewed liked the feeling of anonymity, while others wished for greater student-teacher interaction.

Conversely, at the Forum, quiet was given up for the sake of greater student-teacher interaction. I observed the class from a higher level than the teacher stood, as one might in a surgery theater, yet the room was more confined in space due to the raised angle of seating. As a result, some of the impersonal was made personal by the greater opportunity for eye contact between teacher and student. Everyone is in the bright fluorescent lighting and there is more a sense of being at a sporting event. The physical atmosphere of the Forum may have led to greater participation by students and student-teacher interaction, but it also led to a greater noise level that often got in the way of the lecture, especially when the noise wasn't related to discussion.

The mood of students was not affected by architecture alone, however. The instructor's use of language played a huge role in the last five minutes. In the five examples of class sessions I gave at the beginning, language was used in different ways to different ends. One instructor's statement, "I have five minutes left," became a plea, but when another said, "I want you all to be quiet and don't bang chairs," the professor was issuing a command. As opposed to the first, the second class became quiet and took down the final bits of information the professor wrote on the chalkboard. Tone of language did not solely affect student reaction, for language also became a trigger mechanism, and to some extent the students anticipated this. With statements like, "Because we're running out of time..." or, "and next time..." the class acts—putting away notebooks, closing desks, and leaving. Often, the instructor went on to say some final remarks that many students missed, having already left the building.

The factors of architecture, language, and certain intangibles like student emotions or respect gained for an instructor over time appear to be inextricably linked as one whole. However, regardless of the physical atmosphere inherent to buildings such as Schwab and the Forum, and even the technical aspects of how language can trigger reactions from students, respect is what ideally leads to a successful classroom setting at the end. I think this is obvious, but it isn't a wasted point. Respect is something that must be mutual, something that provides a solid foundation for the relationship instructors have with their classes. Where the class takes place, whether it be in a grand, dark setting, or a more confined, bright space, matters little if this foundation exists.

As Rob Billingham's observations suggest, the general principles for teaching large classes well are mostly identical to the general principles of good teaching. The way the teacher interacts with the class is as important as it is in smaller classes, and mutual respect forms the basis for a positive class atmosphere.

This is the philosophy underlying Helen Manfull's teaching of large class sections. In the following reading, she reflects on the "very special and subtle relationship that must be established between professor and student" and the challenges of establishing that relationship in large class sections.

On Relating Effectively to Students in Large Class Sections[35]

HELEN MANFULL

Professor Emeritus, Department of Theatre Arts
Outstanding Women's Faculty Member Award, 1989
Lindback Award Winner, 1985

When I was asked to participate in this seminar, I was deeply involved in directing *Machinal*. I become singular and compulsive when I'm directing, so I suggested a very generic topic: relating to students. After coming up with a catch-all topic, my second thought was, "Oh, God. They'll find me out!" No matter how many years I teach, I am still convinced that one day everyone will be made poignantly aware of what I have tried so hard to keep secret all these years—that I haven't the foggiest idea how to teach. All actors have what is called the actor's nightmare. You're standing on stage and don't know your lines. Mine is a little bit worse: I don't know my lines, my costume is scotch-taped only to the front of me so I can't turn around, I don't know what I'm supposed to do, and one of my colleagues keeps telling me that I'm doing it all wrong.

After meditating on both these points—that I have nothing fresh to say and that I am a fake—I decided the only thing that could redeem me was absolute honesty. I have to admit that I never set out to be a teacher. In high school I wanted to be a psychiatrist or a criminal lawyer (theatrical ambitions at heart), and in college, a biologist or a historian. I must confess that in my life I have taken only one education course. When I was an undergraduate at the University of Minnesota, I took educational psychology. One could substitute it, under certain circumstances, for basic psychology. My professor was old Dr. Young whose most beloved quip in class was, "As I said to my wife in bed last night. . . ." Rumor had it that Doc Young never read the essay exam questions he assigned. A friend decided to challenge this notion by writing in the middle of her exam, "Is it true you don't read these responses?" Carefully penciled in the margin was, "Don't believe everything you hear." A good lesson in teaching!

Teaching is a very special and subtle relationship that must be established between professor and student, and it cannot exist when names are not known, a situation that is especially problematic in large class sections. When you look out at that sea of faces, it is too easy to treat them as one generic mass. You learn to dread the superficiality of the inevitable questions. "Will this be on the test?" "How many questions?" "Do we have to know dates?" "I wasn't in class last Friday; did I miss anything?" You feel discouraged when, after an exam in Eisenhower auditorium, you find all the terms and definitions from the class carefully penciled onto a lap board—more work in meticulous copying than in trying to grasp the material. Yes, I could go on and on about the problems, but I'd rather concentrate now on a few that you see students as individuals, not as a sleepy, dull mass. Sometimes it's too easy to label a whole class as apathetic, listless, and lifeless, thereby absolving yourself of responsibility. But if you can get to know the students, even to a limited degree, as individuals, your perceptions of them change. And the rewards are magnificent. When an engineering student comes to the office and tells me that he or she has never experienced theater before and that it has somehow affected his or her life—then that is its own reward.

3. Treat each student with respect and with regard for his or her humanity. I remember once years ago saying to a student, "Why don't you get your ass to class once in a while!" This man is now a distinguished lawyer

[35] Originally given as an IDP Master Teacher Seminar on November 5, 1992.

in town, someone I see often, and I am always a little humiliated by that comment of mine. I would not makeit now even if I wanted to. I have learned better. Last week, a student told me that at her commonwealth campus, one of her professors had asked her, "Do you ride your bike all winter?" She was so impressed that the professor had noticed and cared. Small gestures of kindness can make such a difference!

4. Ignore what fellow teachers have to say about a student. I remember a young man who had a terrible reputation as a goof-off, but no one had ever told me. I found this student engaging, warm, intelligent, motivated, funny, and attentive. When my fellow teachers and I began to compare notes, we could not believe we were talking about the same person. This has happened any number of times in my teaching career. Assume all students are rational, intelligent, motivated individuals. Although they may prove otherwise, try not to encumber students with other teachers' evaluations and labels. Last year a young woman came to my office saying, "I don't know why I'm not doing better. I come to every class, and I take good notes." My teacher's heart reached out. I wanted to help. But a few minutes later she told me that money was a little tight and she had not bought the textbook. "But it is on reserve in the library," I gasped, "or surely you could share with a friend!" Very soon her "too much trouble" signal caused me to back off. I too became indifferent. Until students shoot themselves in the foot, however, I try to see them with fair and unbiased eyes and assume that they are as profoundly interested in the material as I am. When students feel that you believe in them, they frequently perform better than even they expected.

5. Acknowledge and respond to all questions. There is no such thing as a stupid question. Students ask questions because they have a genuine need to know. We have to recognize that at a university of this size, students vary greatly in age, life experience, travel, and background. Never laugh at or belittle a student's question or response. Nor should you tolerate rudeness to a student by another student. Even in a class of 375, I demand courtesy while someone is speaking.

6. Give students time to answer your questions . . . by waiting. Teachers are very afraid of dead air, so they rush in and answer the question themselves. If you do this, your students will quickly learn that you don't really expect them to think or attempt a response. Many times after asking a question, I have stood before a class silently quoting Shakespeare's Antony, "I'm dying, Egypt." But if I am willing to wait and allow that long, long pause with all eyes downcast so as to avoid my gaze, eventually someone responds.

7. Don't be afraid to say that you don't know. When you are a young teacher, you want to be smart. It's hard to say you don't know. Yet, it's almost a relief to students when they realize that their professors are not walking encyclopedias, but have to do research, study, and look things up to satisfy intellectual curiosity. The older I get the more apt I am to draw perfect blanks in the classroom, but students seem compassionate and sympathetic to my encroaching senility.

8. Keep your sense of humor and be yourself. Don't be afraid to laugh at yourself in class. If you invert dates, name the wrong century, or say "virgin" when you mean "version"—just laugh at yourself, let them laugh at you, and then go on. I would say that this is one of the most important techniques of relating to students. It relaxes the classroom, proves you are human—and even a little bit vulnerable. I remember that my seventh grade teacher had a terrible temper. In a rage, she once got her foot caught in the wastebasket. She engaged in outrageous antics trying to remove the wastebasket from the foot and the foot from the wastebasket. She seemed to me at that moment inhuman, robot-like, and certainly out of control. Then slowly she began to laugh with us. We laughed and laughed. It was a real turning point in our relationship with her.

9. Keep regular office hours. I try to hold five office hours a week. I also let the students know that I will see them at other times. When you teach 375 students in two sections, it is a pleasure to meet with them one-on-one in the office. However, this is probably the most fatiguing kind of teaching. It can also be the most tedious and repetitive. If you are a young professor, don't make yourself too available. Salvage time for

going to the library or stealing home to do your own work. Even a few predictable office hours per week can make a tremendous difference to you and your students.

10. Reflect often on what occurs in your classroom. Ask yourself: "How could this day and this class have been better, more productive, more challenging, more meaningful to the students?" Keep notes and modify your work based on what you discover. Above all, try new ways of handling old material. Solicit and welcome commentary. Just last week I was leading a discussion in one of my large classes, and there were visitors—parents sitting in the back of the room. Afterwards they told me they couldn't hear the responses of the students who sat near the front and suggested that I repeat these answers. It was good criticism. Similarly, some years ago I was teaching a drama class with small children. We were going to present a toy shop dramatization, and I had cut pictures of toys from magazines that the children would act out. I gave the girls dolls, ballerinas atop music boxes, and stuffed animals and the boys astronauts, soldiers, and knights. When the lesson was over, a young female student asked me why I had given the girls all the dumb things and the boys the neat things. I protested. But she was right. It was an early lesson in raising my consciousness about stereotyping women's roles.
11. Get one or two mentors. Ask faculty members you respect and admire to visit your classes and give you honest feedback about your teaching. Similarly, visit their classes. This is terrifying if you're in a tenure-track position because you're afraid that it may be held against you. But if you do it in the proper spirit, the other faculty members will be honored and flattered. I had such a mentor in my husband, Lowell Manfull, who is a wonderful teacher. He helped me learn to think on my feet, to ask better questions, to be tougher, and above all, to hang on to my principles.
12. Maintain your enthusiasm for what you teach and for the people you are teaching. When it becomes dull, monotonous, or automatic—then it is time for someone else to take over and for you to move on to another subject or another challenge. It is easy to get too comfortable in teaching the same course over and over. About the third time I teach a class I feel as though I have it by the tail. I feel I don't have to prepare so much. The jitters subside, which is very dangerous. Complaisance is the enemy of effective teaching. At the very heart of the matter is a genuine love of teaching, of the material, and of the people you teach.

I recently heard Athol Fugard, that marvelous South African playwright, speak about his work and the potential to affect one human being. If that can be done, then perhaps we have the potential to reach a whole group of people. I think I became a teacher because I wanted to be part of that growth, of that striving to be better than we are. When I think back to my own college education, I wonder if it was very much about book learning and facts. I think it was more about exploration, expanding horizons, getting in touch, trying new things, pushing against boundaries. To be a part of that process for other people—while often exasperating and frustrating—is none the less one of the most rewarding and exciting adventures of my life. But there are no magic wands, no secret formulas, no facile answers. It is bloody hard work, it is trial and error, it is failure after which you pick yourself up and dust yourself off, and at times, it is making a colossal fool of yourself. Then one day a kid appears at your door and says, "Can I talk to you about that Strindberg guy? He really knocks me out!" Suddenly everything is worth the struggle.

As Helen Manfull's guidelines for large classes clearly illustrate, teaching a large class well means more than just preparing a good lecture. Like other classes, large classes work best when students take an active interest in the subject, and when teachers personalize their presentation and respect their students. However, while these basic principles of good teaching apply in large as well as small classes, the sheer number of students in a large class can magnify some problems that might be much more manageable in a smaller class. For example, an occasional late student or two in a class of forty is not a big problem. If one

student comes late to class repeatedly, it's easy for the teacher to initiate a conversation after class to find a way to resolve the problem. In a class of four hundred, however, late students can be more plentiful—and disruptive—and more elusive after class. Teachers of large classes commonly have questions about how to handle the impact of so many students on issues like attendance, interaction, assignments, feedback and exams. Here, we address some of these questions with tips from those who teach large classes at Penn State.

Commonly Asked Questions about Teaching Large Classes

HOW CAN I ENCOURAGE ATTENDANCE IN LARGE CLASSES?—Those who teach large classes report that low morale and poor attendance are common because the student often feels like "just another face in the crowd." One way of increasing attendance is to keep a record of who is coming to class. The ordinary ritual of taking attendance, however, becomes a logistical nightmare in very large classes. In fact, if you try to handle attendance in a class of 500 precisely as you might in a class of 20, there may be no need for course planning! While there is no perfect solution, some teachers have streamlined the process by having students sign in at the door, using assigned seating and having TAs mark absences on a seating chart. Or you may find it serves your purposes better to take attendance only at irregular intervals.

A more interesting challenge underlying the question of attendance is how to motivate students to come to class regularly. Many teachers give in-class quizzes that count towards the final grade. These quizzes can be administered regularly or as pop quizzes. They can be given at the beginning of class to get feedback on the assigned reading, or at the end to test comprehension of material just covered. Students can even respond on scantron sheets to be scored by University Testing Services, so that the quizzes take up little of the instructor's time. An alternative to using quizzes is to draw exam questions from material presented or discussed in class. This sends a message that what takes place in class is important. You can also draw exam questions from good examples and applications that students themselves have suggested in class.

Some teachers find that incorporating groupwork or in-class assignments also motivates students to attend large classes. Jim Eisenstein (Political Science), for example, offers a variation on quizzes—the "group" quiz. Small groups of students discuss quiz questions before submitting their answers, learning from each other as they interact. Eisenstein suggests establishing permanent small groups to create a sense of community, which also encourages attendance. Dorothy Blair (Nutrition) takes a different approach: "Give weekly, in-class assignments that can be done in 20-30 minutes and that give students the chance to apply what they have learned. Students can work individually or in pairs. Give students credit for completing assignments, but don't grade them. Doing this one day a week creates *esprit de corps* and can raise attendance on other days as well." As Eisenstein and Blair suggest, reducing student anonymity in a large class is the key to fostering good attendance. It is also important to put the issue of attendance in

proper perspective. Many teachers of large classes remind us that the point is to get students to attend so that they can participate in class activities that will result in learning. Taking attendance only for its own sake can backfire and often leads to resentment among students.

Even when students attend class, they may arrive late or leave early. Once again, what is relatively easy to handle in small classes can, if unchecked, become a real hindrance to learning in the large class section. One simple solution for preventing late arrivals comes from Robert Mitchell (Biology), who recommends starting on time every day without exception. When students know that the session will be well under way even if they are only a few minutes late, they make the extra effort to show up on time. Mitchell uses the beginning of class to take questions relating to the lecture of the day before, thus reviewing and getting the class ready to start with the new material. Other faculty members begin the class by showing the outline for the day's session on the overhead. The bottom line for getting students to class on time is to make the first few minutes of every class count.

As was evident in Rob Billingham's vignettes and analysis, the last five minutes of class pose attention problems of a different sort—premature "dismissal." To prevent students from leaving class early, several teachers have suggested assigning homework at the end of the class. Allen Phillips (Biochemistry and Molecular Biology), borrowing an idea from John Lowe (Chemistry), assigns a problem to be solved before the next class period. He collects the solutions at the beginning of the next class, thus checking both attendance and understanding. Similarly, Shannon Nichols (English) assigns a question about the readings for the next session and asks students to write paragraphs in response. "This helps generate better questions and comments for discussion at the next session. Collect all, some, or none depending on how much time you have to look over them." Alternatively, Linda Trevino (Management and Organization) ends each class by putting a short list of "study tips" on the overhead: "Let students know from the beginning of the semester that class will always end on time and with this feature. Select tips that will help students understand the material and do better on exams. Students always copy the tips before leaving." Sydney Aboul-Hosn (Comparative Literature) explains her expectations to the class, saying, "I promise to release you on time, but I must have your full attention until I end the class." She tells us, "If that doesn't work, drawing an exam question from the last points of the session usually makes students pay attention."

HOW CAN I GET STUDENTS ACTIVELY INVOLVED IN THE CLASS?—Probably the biggest concern about large classes is whether it is possible for students taking them to be active learners. Many of the common critiques of the lecture are often leveled at the large class: students can be passive, anonymous, and uninvolved with the teacher, the material, and their classmates. However, as we know from talking to experienced teachers at Penn State, these characteristics are not inherent to the large class. Teachers in a variety of disciplines promote active learning in their large classes, through discussion, questions, and student involvement.

The first and perhaps most important step is to find ways to reduce student anonymity. Although it may be impossible to get to know each student by name, experienced teachers of large classes agree that learning as many names as possible is the most effective way to involve students in the course. Learning just a few names each day—and using them—humanizes the atmosphere of a large class. One common suggestion for getting to know students is to arrive at the classroom early and stay after class, encouraging students to talk about class material and introduce themselves. Robert Mitchell suggests walking into the auditorium from the back and learning the names of some of the students sitting along the aisles, then calling on those students by name during the class session. Larry Spence (Political Science) asks his students to wear name tags so that he can call on them by name. Calling on students, even if you don't know their names, gets them involved and can encourage others to volunteer.

Teaching with collaborative activities is another way to reduce the anonymity of large classes. Students in large classes are less likely to get to know each other or to interact—either in or out of class—so they may not develop the habits of active learners. Using groups, either for in-class activities or on longer graded projects, gets the students involved and allows them to feel like part of a community of learners. Recitations and lab sections can help achieve this goal; in fact, some teachers encourage students to get to know each other by asking them to name several other members of their lab section on lab quizzes or the lab final. Even if labs or recitations are not part of the class, small sessions can be used to reduce anonymity. Rebecca Corwin (Nutrition) trains a group of undergraduate teaching assistants—students who have taken the class in the past—to lead small-group discussion sessions. Her current students receive the benefit of discussions with their classmates, and the TAs reinforce their own understanding of the subject by leading these sessions. Corwin's initial findings indicate that incorporating small groups led by undergraduate TAs can reduce the number of failures and dropouts in a large class. This approach is often used by teachers who are not provided with graduate student TA support but can also be used to supplement such support.

One can also encourage involvement by acknowledging student contributions. John Lowe (Chemistry) has found "participation points" to be effective for encouraging a wide variety of students to make multiple contributions throughout the semester. At the beginning of the course, Lowe tells the class that he will collect participation points which can push up a borderline final grade. Then, throughout the semester, students are awarded points for any kind of in-class participation—asking a question, answering a question, or making a comment. Students who speak out in class hand in slips of paper with their names on them, and Lowe records the points after each class period. As an added benefit, he says, "this method also helps me get to know who's who, which means the next time they raise their hands, I can call on them by name. That makes a big difference in the general feeling of a large class." This technique encourages all students to participate without putting one group of students on the spot.

Another suggestion for getting students involved is breaking down communication barriers by bringing your profession and your personality into the classroom . Robert Mitchell, like Helen Manfull, uses humor to create a comfortable classroom atmosphere. Or simply telling the students something about yourself, your research, and your interests can help students feel more comfortable and willing to speak up themselves. Just being enthusiastic about your subject can foster interest in the field. Michael Morse (Kinesiology) and others suggest inviting guest lecturers from applied fields to speak on the profession and other topics that will interest students. Similarly, you might bring the outside world into the classroom by drawing examples from current events in your field and asking students to bring in relevant articles for the class to read.

Finally, make sure you also take advantage of the available instructional technology. Many teachers of large classes depend on overhead projectors with large print transparencies, laser pointers, and computers with display capabilities for making sure that students can see illustrations and written materials that are being discussed. In most large classrooms, microphones are also a necessity. If students have difficulty hearing you and if you cannot hear your students, then meaningful interaction clearly cannot happen. Most teachers prefer a cordless microphone so that they are able to move about the room and interact with students. Some teachers find e-mail indispensable for communicating efficiently with students outside class and for helping them to be active learners. As Rich Yahner (Wildlife Conservation) has noted, anything that makes a large class seem small is a positive addition. Making use of the available technology can help you solve some of the problems inherent to large classes.[36]

HOW CAN I PERIODICALLY CHECK STUDENT PREPARATION AND LEARNING?—Giving more tests (whether pop quizzes or scheduled exams) that cover less material is one obvious way to provide students with regular feedback and encourage them not to fall behind. University Testing Services can even set up out-of-class tests in computer labs that students can take as self-checks of their understanding. Although such tests are not proctored, this tends not to be a problem if they count for only a small proportion of the final grade. While quizzes can be designed for computer-scanning or administered to small groups to save grading time and encourage collaboration, homework problems and writing assignments pose unique challenges to large class section instructors.

Many instructors have found that even when students read the assignment they often do so without comprehension. Providing some general tips about reading and note taking early in the semester, as well as specific questions to think about as they read a particular assignment, can greatly increase student motivation and efficiency. By making your expectations clear, you are also providing students with important strategies that they can apply as they study. When students know how to read for important points and

[36] For tips on using overhead projectors and other visual displays effectively, see the section on teaching with the lecture method in chapter 2.

how to make connections between these points in their own words, they stand a much better chance of using class time to improve their understanding.

While homework is a standard and valuable check for student preparation and understanding, reading and marking these daily homework assignments can be a formidable task, especially if you do not have TA support. Many teachers make the process more manageable, however, by keeping written assignments short and using a simple evaluation technique, such as check/plus/minus. John Lowe (Chemistry), for example, assigns a daily problem at the end of each chemistry class, to be turned in at the start of the next session. The problems are graded on an 0-1-2 basis: 0 for failing to turn it in; 1 if the problem is turned in, but incorrect; and 2 if the problem is correct. The daily problem is easy to grade, but works well as a check for preparation and understanding. Alternately, Reinhard Graetzer (Physics) finds collecting homework from randomly selected recitation sections at each lecture period to be an effective practice. The homework should relate to the material for the upcoming lecture, so that it encourages students to work ahead and gives the instructor early feedback on what students are having difficulty understanding. Using this method, you can easily collect homework from every student several times during the semester. Because students do not know when they will be asked to submit their work, they tend to do it regularly.

HOW CAN I PREVENT ACADEMIC DISHONESTY?—Most teachers of large classes feel that genuine student collaboration on homework should be encouraged as this promotes broader learning objectives. However, instructors do worry that as long-term group projects become more common, students will not always know when it is appropriate for them to do their own work or what constitutes plagiarism in written assignments.

Some teachers of large classes simply do not assign papers of any length because they feel they cannot offer the in-depth feedback that will help students improve their writing skills. Many other instructors, however, believe writing assignments add a dimension to the course and the students' learning that exams alone cannot. If you have the support necessary for grading written assignments, the best thing you can do to prevent plagiarism is to make sure students know precisely what your expectations are. Provide a written description of plagiarism with examples, and allow some class time to talk about what you consider to be unethical and to answer students' questions.[37] To reduce the opportunity for plagiarism further, some instructors enforce deadlines for the components of the writing assignment—this allows the teachers and their graders to see each student's work as it progresses through topic proposals and several drafts. Other ways to discourage plagiarism include assigning only in-class writing or using an in-class writing sample to serve as a benchmark of each student's writing style.

Since most teachers of large classes use multiple-choice exams to accommodate the size of their classes, preventing cheating in exams is another challenge. The first step towards prevention is a clear

[37] A sample plagiarism handout from English composition classes is included in appendix C.

statement on the syllabus specifying the University's policy on academic dishonesty as well as what will happen if students are caught cheating in your class. To neutralize the effect of a few students with access to past exams, some teachers share old exams with their entire class—of course, this requires using different exams each semester. When your large class takes exams, join your proctors in monitoring the room or rooms where the exams are taking place. You might also use a seating chart and scramble the order of the exam questions, coding the exams so that no adjacent students receive the same question sequence. Many teachers have suggested ways to make sure that the students enrolled in your class are actually the ones taking the exams. One of the most common suggestions is to check signatures and student IDs against the scan forms as students turn them in. Some teachers also have students sign a class roll or the exam itself in addition to the ID check.

Finally, a big challenge for those who teach large classes is reducing unnecessary requests for conflict and make-up exams. In a class of four hundred, it is likely that some students will have legitimate conflicts or unexpected emergencies that will make it difficult for them to attend the scheduled exam. Indeed, although some students may fabricate such conflicts or emergencies to postpone taking a test, many teachers of large classes report that they always assume the student is telling the truth. Establishing make-up policies in advance keeps teachers from having to judge whether or not students are telling the truth. For students with conflicts, many large class instructors schedule a conflict exam prior to the regular exam—often the same exam given at an earlier time on the same day. Although last-minute emergencies are more rare, students will occasionally have to miss both the conflict exam, if offered, and the regular exam. For these students, instructors often feel they must create a different make-up exam since most members of the class have already seen the regular exam and could provide unfair assistance. In the worst-case scenario, students who missed the exam could obtain a copy smuggled out by a classmate. Given the complexity of such situations, large class instructors should develop policies that discourage unwarranted requests for conflict and make-up exams.

Since family emergencies do occasionally necessitate missing an exam, teachers can help students handle such emergencies by letting them know about the Assistance and Information Center. (See the directory listing in Appendix F.) For students who must leave campus on short notice, the Assistance and Information Center maintains a 24-hour family emergency phone line and will, under certain circumstances, contact the student's instructors. Informing students of this service not only helps them know what to do if and when emergencies arise but also reduces the chances that they will fabricate family emergencies simply to delay taking an exam. Large class instructors at Penn State have come up with other ways to discourage unwarranted make-up exam requests. Some set a policy that all make-up exams will be essay exams instead of multiple-choice. This policy tends to discourage students from requesting make-ups because most students perceive that essay exams are graded more stringently. Others set a policy that requires the student to provide written verification of hospitalization, a death in the family, or

other emergency in order to take a make-up exam. Some departments simplify scheduling concerns by offering all make-up exams on only one day in the semester. Rather than offering conflict and make-up exams, some instructors simply weigh the other exams—or the final—more heavily to make up the difference for those who have missed a big test. This may be a viable option in classes where there are many exams or where the final is a comprehensive test.

HOW CAN I GET FEEDBACK FROM MY STUDENTS ABOUT THE COURSE?—In a large class, it can be difficult to tell how students are responding to the material, the class activities, and the pace of the course without a systematic procedure for collecting feedback. Because of the sheer size of the room, a student sitting in the front row may have a completely different perception of the course than a student sitting in the back. Further, an instructor who cannot easily see faces for signs of understanding or confusion will have fewer informal cues to go by than someone teaching a small section. Since the majority of students in large sections will probably never communicate directly with the instructor, there is no way to know how many students are represented by the few who approach you with a problem or question. Hence, the systematic collection of feedback is perhaps even more crucial in large sections than in small sections.

Collecting student feedback in sections of any size is a good idea for two main reasons. First, it helps the teacher gauge the effectiveness of the instruction. Second, it provides a context in which students can reflect on their own learning. Most of the general feedback strategies discussed in chapter 5 can be adapted to large class sections without substantial changes. As in all large class endeavors, the instructor must balance the collection of student material against the staff hours needed to process that material. With this in mind, teachers of large classes often devise some interesting and efficient ways to adapt general feedback collection techniques to large classes. For example, rather than collecting minute papers from each student every day, they collect responses only from a random sample of students. Some instructors even find it useful to pass out only three response sheets at the start of each class—one in the front of the room, one in the middle, and one in the back—and ask these three students to comment on the logistics of the class as well as the clarity of the day's session.

Another method is to form a student feedback committee. During the first week of her large nutrition classes, Rebecca Corwin asks for ten volunteers to serve on an executive committee that meets with her every other week throughout the semester. At these meetings, the student committee members provide feedback on every aspect of the class—lectures, assignments, group work, exams, and classroom atmosphere. According to Corwin, the valuable feedback she receives from the executive committee makes the minimal commitment of her time worthwhile. The students do not receive extra credit for participating in the executive committee, but they appreciate the opportunity to get to know a professor and to give input on the way the class is run. Similarly, Arthur Anderson (Architecture) meets weekly with such a committee at various sites of architectural interest on or within walking distance of campus. His students

receive all the advantages of on-site learning, and Anderson gets valuable information that he can use when planning the next week's class.

As the varied experiences of the Penn State teachers mentioned in this section—as well as many others—suggest, there is no one right way to teach a large class. The challenges raised by the sheer scale of a large class section, the elements of the course, and the classroom itself can be addressed in many creative ways. As these teachers have discovered, one of the best ways to learn how to handle the special circumstances of large classes is to talk with the other Penn State teachers who are responsible for teaching these classes across the University. Their collective knowledge and experience are one of the most valuable teaching resources at Penn State. And their success demonstrates that large classes can be effective ways of achieving particular educational objectives.[38]

Teaching Assistants and Section Leaders

At Penn State, as at most large universities, teaching assistants play a significant role in undergraduate education. Hopefully, the advice throughout this handbook will be useful to all teaching assistants, especially those who are independent instructors. However, TAs who conduct labs, discussions, and recitation sections that meet as an accompaniment to lecture presentations by faculty members have some special concerns and needs. These TAs are in a unique position for several reasons. First, they generally deal with only a subset of the members of a class. Second, they often simultanously act as both instructors and as mediators between the students and the professor in the course. Whether you are a professor who works with TAs, or a TA yourself, this section will offer some guidelines for integrating these roles, thereby making the course and the professor/TA relationship as effective as possible.[39]

Effective work relationships between faculty and TAs start with communication—shared objectives, clearly defined expectations, frequent contact, and periodic feedback. At a meeting before the semester begins, TAs and faculty can discuss the objectives and content of the course and agree on TA responsibilities. Professors who make their expectations clear at the start of the semester and TAs who clarify their understanding of their responsibilities usually work more effectively with one another than do those who leave the coordination of their responsibilities strictly to chance. As the semester progresses, periodic meetings, e-mail, and feedback keep the lines of communication open. Frequent meetings that involve TAs in the planning process provide an opportunity for them to develop their teaching skills and to learn from

[38] For more ideas on ways to deal with these and other situations that occur in large classes, refer to the special section for teachers of large classes on the CELT Web site (*http://www.psu.edu/idp_celt*).

[39] The University Faculty Senate has adopted several general guidelines for TA preparation, including the following: (a) TAs should be provided with the course objectives and the content that will accomplish those objectives; (b) they should be prepared and instructed on general teaching strategies as well as methods specific to the course material they will be teaching; (c) they should receive faculty supervision and mentorship; and (d) they should receive feedback on their teaching. While these University guidelines are primarily intended for departmental TA preparation programs, they are good rules of thumb for relations between faculty and the TAs who assist in their teaching.

the professor's experience. Regular meetings can also benefit faculty because TAs can provide valuable feedback about student progress and understanding in the course.

In addition to weekly meetings, some faculty ask their TAs to attend class on a regular basis in order to create a greater sense of continuity between the lectures and the recitation or discussion. As Scott McHugh (Mass Communications) says, "If students are unclear about a concept, it is good to know how it was discussed in class so you can build on the professor's explanation." In addition, many faculty make it a point to attend each TA's lab or recitation section at least once during the semester in order to provide feedback on the TA's instruction. Some units, such as the Departments of Anthropology and Food Science, and the Colleges of Business Administration and Engineering, offer formal courses and mentoring programs through which TAs receive structured feedback on their teaching and their materials throughout the semester. Whether the feedback is formal or informal, TAs can best develop their teaching skills when they are supported and instructed by experienced teachers.

While departments and individual faculty can do much to support graduate students who teach, TAs themselves also play an active role in their own development as teachers. Like all teaching, being a TA requires planning and self-reflection. Liam O'Neill (Management Science and Information Systems), for example, through his various duties as a TA has spent a lot of time thinking about teaching. In the essay that follows he offers useful advice to other TAs.

Guidelines for TAs

LIAM O'NEILL

Graduate Teaching Assistant
Department of Management Science and Information Systems

Since coming to Penn State in 1992, I have served in almost every possible graduate assistant capacity, including grader, recitation instructor, research assistant, and teacher of five different undergraduate courses. During that time, I have discovered—either by violating them myself or watching other TAs violate them—some of the basic principles of being a TA. From my experiences and observation, I have arrived at the following guidelines to help new TAs avoid these problems. Some are general; others are specific. Some are common sense; others are less intuitive. In short, they are things I wish I had known four years ago.

In my first semester at Penn State, I was one of two TAs for a course with almost 800 students (two sections of 400). My job consisted of conducting lab sessions, holding office hours, administering make-up exams, grading exams (by computer), and proctoring. Last semester I was the coordinator for a course with 800 students, six TAs, and two professors.

Several months ago, I noticed that a good friend from a different department, who happened to be the TA for a large section, had become visibly upset, apparently because she had been reprimanded by her professor for missing

class. Because she had been ill that day, she felt she had been treated unfairly. As I talked with her, I soon realized that this unfortunate incident was the symptom of a deeper problem.

The biggest source of frustration for both professors and TAs is the inherent ambiguity of the TA's responsibility. This ambiguity underlies the conflicting viewpoints held by TAs and professors. The TA may feel that he or she has done all that was required and cannot understand the source of the professor's dissatisfaction. Conversely, the professor may feel vaguely unsatisfied with the TA's performance. Thus, it is important for TAs to realize that there is often a sizable gray area between their explicit task and what their professor expects or wants from them. To further complicate matters, TAs tend to focus more on the academic aspects of their job, such as teaching lab sections and tutoring students during office hours. Professors seem to emphasize the TA's administrative tasks, such as proctoring exams, giving make-ups, posting grades, and reconciling student difficulties. This discrepancy leads to the first guideline:

1. Insist on brief weekly meetings with your professor.
A TA's work tends to be sporadic, with peaks occurring around exams. Yet, going for weeks without seeing your professor is inviting disaster. Thus, you should see your professor regularly, preferably with an agenda. If the professor is too busy to see you, then stop by during office hours.

2. Stress teamwork.
Don't ever play yourself off against the professor. For example, don't say, "I'm not sure why she put this question on the exam," or "If it were up to me, I would drop the lowest quiz." If you work with other TAs, be consistent in what you tell students regarding exams, make-ups, grading policies, and so on. Don't criticize another TA to the professor except under extreme circumstances.

3. Take your job seriously.
Be in your office during office hours, even if no one ever comes. If your professor asks you to conduct a review session before an exam, don't say, "I have volleyball practice," or "I have friends coming in from out of town." A better answer would be, "Where? What time."

4. Keep written records.
Consider the following hypothetical scenario: A student you have never seen before walks into your office two weeks after a scheduled exam.

Student: I'm here for the make-up exam.

TA: What make-up exam?

Student: I talked to Professor Smith. He gave me permission to take the make-up and told me to stop by during your office hours.

This is a tricky situation. I would probably ask the student to write a note explaining why he missed the scheduled exam and clearly stating who gave him permission to take the make-up. Then I would administer the exam. If Professor Smith said later that he never heard of that student, the note would protect us both.

5. Expand the scope of your responsibilities wherever possible.
Teaching a course with 800 students is stressful, even for a professor. Part of your job, perhaps the most important part, is to help alleviate that stress. One way to do this is to act as a buffer between the students and the professor. Regardless of your explicit duties, think of yourself as a "problem-solver." If a student comes to you with a problem, do your best to solve it, rather than simply referring the student to the professor. By taking on part of the administrative burden, you allow the professor to focus on teaching the class.

6. Be proactive.
Take the initiative. For example, if students are having trouble mastering the software, you might offer to conduct an additional computer lab session. If you are familiar with the World Wide Web, you could suggest building a class homepage. The most important thing you can do as a TA is develop a reputation as someone who gets things done.

7. Remember Murphy's Law.
Sometimes, despite your best efforts, things go terribly wrong. For example, last semester as I was handing out the final exam, I realized that one of the test forms was missing three questions! In such a situation, it is generally best to defer to the professor. If you follow the above guidelines, however, such crises will occur less often, and they are more likely to turn out favorably.

Liam O'Neill's reflections address the crucial question of the TA's role in relation to the professor and the course as a whole. If you are a TA for a lab or a smaller section of a large lecture class, your primary purpose may be to amplify and clarify the concepts covered in the lectures, often through leading problem-solving and discussion sections.[40] One of the keys to making this position work is to realize its unique and full potential. The teaching assistant role is an excellent one for demonstrating—in a more personalized setting than a large lecture—how to approach the material at hand. However, many students, especially freshmen, may begin by assuming that your role is an information-giving one. Make it clear from the start that the information you provide is meant to supplement, not replace, the material presented in the main lectures. Kelly Bricker, a TA in leisure studies, suggests building a relationship with students that can be characterized as a "learning partnership," based on mutual respect and encouragement.

Let your students know from the outset that your sessions will be used to show them—largely through demonstration—how to arrive at more appropriate questions, how to avoid the conceptual pitfalls, and how to approach the material in a more efficient and systematic fashion. If you lead a discussion section that supplements a larger course, the agenda for your discussions will be largely determined by the questions and problems that your students encounter with the material. In a recitation, one way to clarify the connection between your sessions and the professor's lecture is to refer specifically to points made in the lectures as you support them with additional explanations and illustrations. If you are teaching a practicum or lab section, a mini-lecture may help your students prepare for the day's activity. Alternatively, you can also use the mini-lecture to make connections between what you are doing in the lab and what was said in the lecture. Obviously, you will need to attend most, if not all, of the professor's lectures—or listen to them on tape—if you wish to be able to refer to the larger class in this way.

As you prepare to teach by reviewing the material and attending the lectures, try to remember the obstacles that you encountered when first learning the material. Keep a list of these obstacles and raise

[40] No matter what your teaching assignment, you will find suggestions for appropriate teaching methods in chapter 2, "Matching Methods to Objectives." If you are teaching a small section, you may find the passages on discussion teaching and problem-solving methods particularly helpful.

them as initial questions when you begin a session. Find out whether your students are experiencing similar kinds of difficulties and confusion with the concepts, lectures, or problem sets. For a lab or a practicum, prepare your mini-lecture and be sure lab instructions are clear. Check that all the required materials are available and that there are enough stations or samples for all the students to complete the lab. Sanjay Radhakrishnan, a TA in Industrial Engineering, suggests preparing for lab sections by performing the experiments the students will perform, on the equipment they will use. He finds that this method lets him anticipate the problems his students might face during the session, and helps him to provide them with prompt and accurate answers.

When it comes to grading, office hours, make-up work, and attendance policies, your professor or department will probably set guidelines for you to follow. Most TAs who teach small sections are responsible for grading homework, exercises, lab reports, quizzes and other work, but these assignments usually make up only one part of a student's grade in the course as a whole. Find out what your professor wishes like you. This is true of all teachers, including those who share a similar cultural background with their students. International TAs (ITAs) face additional challenges and opportunities, however. In the following reading, Helda Pinzon (Health Education) recounts some of her own experiences as an ITA and gives advice to others just starting out.

The Challenge of Being an International Teaching Assistant: An Opportunity for Intellectual and Cultural Growth

HELDA L. PINZON

Graduate Teaching Assistant, Department of Health Education

Teaching Assistants are, by definition, additional resources in the classroom. TAs are expected to help students and professors to enhance the learning process and to alleviate the natural tension generated by the pressures of grading, instructing, and leading. TAs bring into the classroom not only their own experiences as students, but also their own expectations and motivations as teachers. The first encounter with the classroom is, most of the time, a shaking and worrisome experience. Questions and doubts about teaching abilities and communication skills start to appear in the head of new TAs: Will I be able to make it? Will the students understand me? Will they (students and, of course, the professor) question my capability for handling this job?

International TAs, like myself, are not immune to these concerns. On the contrary, these concerns seem to be increased by additional factors, such as language barriers, culture shock, academic overload, and conflict inherent in dealing with a different cultural system and value scheme. Additional questions arise in the head of new ITAs: Will I find the correct English words to say what I really want to say? What is my real level of authority in the classroom? And, of course, the biggest of the questions and concerns is: Will they (students and the professor) think that I am stupid?

Most ITAs are used to an educational system in which the teacher, or any other similar educational figure, has total authority. "Do what your teacher says" is a premise that is strongly rooted in the minds of many foreign students. Consequently, a similar type of relationship in the classroom may be initially expected by ITAs. ITAs bring into the

> classroom not only new knowledge given by the experience of studying and living in a different country, but also a new way for the students to see the world. Undergraduate and graduate students who are taught or helped by an ITA are exposed to different educational approaches and new values incorporated into education and learning. In my opinion, one of the most important contributions that foreign TAs provide, just by being in the Penn State classroom, is that they face students with the need to deal with and accept "difference." ITAs challenge students to recognize the importance and usefulness of listening and learning from someone who is "different." If we, as ITAs, can help students to be more tolerant and more receptive to the values of those who are "different," our goal as educators has been achieved. Perhaps this attitudinal change is what may represent, in the future, the key for students' success in a multicultural society such as the United States.

Many ITAs will identify with the concerns described above. Certainly, teaching in a language other than the one in which they themselves learned that material poses special challenges.[41] Happily, however, the principles of good teaching are the same. Like all teachers, ITAs will benefit from finding out who their students are, planning their classes carefully, and gathering regular and systematic feedback. Good teaching begins with the assumption that individuals are unique, so language and cultural differences need not be obstacles. And, although all beginning teachers derive considerable benefit from consciously reflecting on teaching—what works and what doesn't—for ITAs the benefits of these activities also include greater confidence and skill in communicating with students. Difference in the classroom, in fact, can actually provide an opportunity for learning—on the part of both teacher and student—rather than merely an obstacle. The key, as Helda Pinzon describes, is to learn from and be receptive to one another.

Teaching with Technology

Educational technology is one of the most frequent topics of discussion—and debate—in higher education today. While proponents predict that computers will radically and irrevocably transform education, skeptics compare computers to other technological innovations that have come and gone over the last century. The truth probably lies somewhere in between. Computers probably will never totally replace teachers, any more than books replaced teachers centuries ago. But neither will computers ever entirely disappear from the educational scene. Computers have become so integrated into all aspects of academic life that it is difficult to imagine higher education *without* computers. In fact, teachers at Penn State and elsewhere have been experimenting with computers in the classroom for at least 25 years. Perhaps their stories—of both success and failure—are a better guide for the future than the ongoing debates between proponents and skeptics.

What are the ways in which computers have been most happily employed as an accompaniment to the educational enterprise? Where does the greatest promise exist? What are their limitations and draw

[41] The International Teaching Assistants Support Group provides the opportunity for TAs—whether international or not—to discuss questions or concerns about cultural differences in the classroom and to share their experiences with others. If you are an international TA with concerns about language differences, the Center for English as a Second Language administers service programs for non-native speakers of English. See appendix F for information about these and other resources that support graduate students who teach at Penn State.

backs? Over the past several decades an increasing number of faculty (at Penn State and elsewhere) have begun experimenting with instructional technology. A recent informal survey of Penn State faculty reveals many interesting stories that may be useful to those who are contemplating using computers in one or more of the courses that they teach.

First and perhaps foremost, these stories clearly reveal that successfully using the computers as an aid to teaching and learning is an iterative process that involves considerable experimentation, planning, redesign, and persistence. Initial efforts are not always successful. Faculty who are most satisfied with what computers can do rarely achieve this success without a few failed experiments and a willingness to try again. Even after success is achieved, one must constantly be open to future changes in technology. One of the most striking themes in the stories we heard was that many faculty found the best uses of the computer to be something other than what they had originally set out to do. Those who begin simply with a desire to use the computer or a particular application often become stuck in a technological dead end, incorporating technology for the sake of technology. However, the greatest successes are clearly those that begin with a need to solve a significant—and usually vexing—pedagogical problem and an openness to experiment with a variety of approaches.

And what are the pedagogical problems that computers seem most suited to solving? High on the list are those that exploit the computer's unique ability to illustrate and simulate phenomena, especially those that cannot easily be observed by students in a classroom. Most teachers who use technology are quick to point out in some cases the best "technology" is the chalkboard and the best "interactive activity" is a discussion. However, in all subject areas there are conceptual relationships that persistently frustrate a faculty member's best explanatory efforts. Computers are uniquely capable of illustrating precisely these concepts. For example, Thomas Smialek (Music) finds that multimedia technology allows him to immediately link explanations to examples and thus help students "build a connection between the cognitive (e.g., the term 'duple meter') and the non-verbal (e.g., a piece of music in duple meter)." To make visible those aspects of a discipline that have historically been difficult to uncover can perhaps have the greatest impact on what goes on in the mind of the learner. And it is here that the impact of computers may be most keenly felt.

Another practical use of computers is accessing meaningful data and "real world" resources. In particular, the Internet is increasingly making it possible to transcend the boundaries of the classrooms. For example, Anthony Verstraete (Managment Information Systems) keeps his business data communications course up-to-date by providing links to current publications and electronic resources. Similarly, students in R. Shannon Duval's course in Science, Technology, and Society, create and maintain a Web site that links to external resources while at the same time publishing their own work.[42]

[42] Links to the Web sites mentioned in this book, as well as many others, can be found on the CELT Web site at *http://www.psu.edu/idp_celt*.

A more obvious pedagogical function of computers is to help students gain experience and fluency using an essential tool of the trade. That is, in many fields—such as statistics, engineering, and landscape architecture—knowledge of specific computer applications constitutes a type of professional literacy. Hence, most faculty in these fields find it impossible to imagine how they would prepare their students adequately *without* allowing them an opportunity to acquire those computer-based skills. As one faculty member has said, "To teach in any other way simply made no sense." Clearly, in these courses the educational use of a computer is not an option but a fundamental necessity that in many cases has been standard operating procedure for a decade or more.

In contrast, attempts to use the computer as a way of giving students an opportunity for what could be called "preprofessional practice" are less clearly defined, and often less successful. For example, some faculty would like to free up class time by assigning certain types of drill functions to the computer, but the existence of suitable software has often been problematic. In fact, many faculty have resorted to writing (or contracting with others to write) their own software. This obviously requires a much larger investment of time and effort. Even in those subject areas best served by such software (i.e., fields like math and language in which rote learning plays a significant role), many find that the benefits are outweighed by the time needed to prepare it.

And, not surprisingly, time—or the lack of it—was the single biggest complaint about using computers as an aid to teaching and learning. Faculty need time to set up each day before class, to convert course materials to electronic media, and to prepare low-tech alternatives in the event of equipment failure. Faculty must often spend time learning the application in the first place as well as deciding how to use it within the context of their courses. And the students need extra time, too. One faculty member reports using computers in his course because "some students were getting bogged down in the mathematics required by the material. . . . The result was that some students became bogged down using the computer."

Faculty stories also suggest that using computers to break down barriers between students and teachers can sometimes unintentionally impose new obstacles. Ultimately, however, the best uses are those that close the psychological distance between teacher and student. E-mail, for example, provides greater opportunity for students to raise questions while allowing them more flexibility to do so. Multimedia demonstrations decrease distance by bringing clarity to concepts that are essential to understanding and appreciating the material. Professional literacy leads students to join faculty as members of the discipline. As students and teacher come closer together, communication moves more smoothly. However, many faculty warn that sometimes technology can unintentionally increase the gap between student and teacher. For example, some discovered to their dismay that their beautifully prepared computer presentations resulted in students sitting passively in the dark with no real opportunity to interact with the teacher. They subsequently revised their courses to integrate computer presentations with other kinds of activities.

On the whole we should probably be optimistic, but not giddy, about what computers can offer to the teaching-learning enterprise. Computers may be a new frontier, but—no more than was true of television— computers are not an educational panacea. In fact, faculty who have made use of computers as an aid to teaching and learning are quick to caution others that "computers are not more or less powerful tools than any other appropriately used media; they will never be able to fix faulty instruction or relieve faculty of the responsibilities to teach." Teachers are the critical element, not the technology. Or as one faculty member recently observed, "Computer technology is not a black box where dreams come true, but a tool that is only as good as the craftsman using it."

In the end, the most prudent approach is to start with a pedagogical problem. One should not begin with a desire to use a computer but with the need to unpack a concept that is frequently misunderstood, to provide students with critical kinds of computer literacy skills, or provide students with access to crucial data or information. In this way, planning to use computers is fundamentally no different than planning any kind of teaching: we begin with a clear idea of what students will learn. The ultimate test of any technological application is not whether it took a lot of time to prepare, was elegantly displayed, or was enjoyed by the students, but what impact it had on those students. How was student learning in the subject affected? Did more students learn these difficult concepts more quickly? More fully? Could they use them more easily, in a wider range of problems? These are the questions that must be asked assessing the value of any teaching tool, whether a computer or something else.[43]

Although there is clear evidence that more effective learning *can* result when computer applications are used appropriately, such an outcome cannot be assumed. Rather, enhancing the teaching and learning process with computers is no different from any other aspect of good teaching—it requires a good idea, thoughtful planning, intelligent problem solving, and a willingness to make mistakes.

[43] Because computers are a tool that can be used in all aspects of teaching and learning, you will find specific examples of educational technology throughout this book. If you are interested in implementing technology into your classes, support is available from Educational Technology Services (ETS), listed in the directory in appendix F.

IV. Measuring and Evaluating Student Learning

Beginning teachers soon discover that grading assignments and giving exams can be difficult and sometimes perplexing tasks. Grades are arbitrary if not backed by explicit grading standards, and some exams test students' test-taking abilities rather than their understanding of the course material. Such difficulties can lead to grade disputes and problems in the classroom. Yet, as those who have discovered how to meet these challenges know, the methods a teacher chooses for measuring student learning are intrinsically connected to the educational goals of the course. Evaluation is not just reward or punishment—it is an opportunity for instructors to provide students with useful feedback that promotes further learning. Exams and assignments work best when they reinforce the course objectives. Likewise, thoughtful comments help students learn how to perform more effectively in the future. In this chapter, we will discuss how teachers connect evaluation with objectives to meet several challenges of measuring student learning: establishing grading standards, writing effective exams, commenting on written work, and dealing with academic dishonesty.

Because many decisions about grading are dictated by the nature of a particular course and its goals and objectives, only the most general issues are covered below. If you are a new teacher with grading responsibilities, consult, if possible, with an experienced faculty member in your department.[44]

Establishing Grading Standards

Once you have decided on your objectives for the course, grading becomes largely a process of translating those objectives into quantified performance standards. Begin by identifying the overall goals students must reach to succeed in your class. Students will not reach all these goals immediately, so you may also

[44] Official University policies on grading are covered in the Academic and Administrative Policies and Procedures Manual, on the Web at *http://www.psu.edu/dept/oue/aappm/aappm.html*.

want to identify intermediate goals that students can work toward early in the course. These intermediate goals leave room for improvement over time yet will not make the early grades so low that your students abandon all hope of achieving the larger goals you have set for them.

From the beginning of the course, make sure the class understands exactly what success entails by making your grading standards clear, distributing them in writing at the beginning of the semester, and adhering to them. Students are more likely to succeed when they know where they stand and how their grades will be determined. Putting your grading standards in writing also provides specific criteria for you to refer to in your written comments and for students to consider when looking critically at their own work. A sample set of grading criteria for essays is included in appendix C, but you will want to design standards that are appropriate for your own class.

In addition to providing students with your overall grading standards, you can also make grading easier by describing assignments in writing. Written assignment sheets give students something to check to see if they are fulfilling the expectations you have set. Furthermore, you can then refer to the details of the assignment in your comments. Being specific about your grading standards before the assignment is due helps students succeed on the assignment and can help prevent grade disputes later. Assignment sheets also give you the opportunity to connect the assignments to each other and to the material being covered in class, thus helping students understand the purpose of the assignments within the course as a whole.

Another fundamental decision you will need to make when establishing grading standards is whether you will grade on a curve. There are two fundamentally different approaches to grading—norm-referenced (or grading on a curve) and criterion-referenced grading. The approach you select should follow logically from what you hope to accomplish and what you can assume about your students. Norm-referenced grading compares each student's performance with that of the other students in the class. Those performing the best receive the highest grades, with the remainder of the grades awarded as necessary to make the resulting distribution resemble a "normal" curve. The assumption in norm-referenced grading is that student performance will be normally distributed. This is not always the case, particularly in very small sections or in upper-level courses populated by students majoring in the field. Norm-referenced grading may also not be an appropriate grading strategy for skill-based courses in which it is hoped that all students will achieve at least minimal levels of competency. Generally, if the goal of a course is to "weed out" students so that the "best" rise to the top, norm-referenced procedures may be appropriate.

Criterion-referenced grading, on the other hand, is often the better option in college courses because it compares a student's performance to an established standard and awards grades accordingly. In a criterion-referenced situation, there are no a priori assumptions about the distribution of student performance. There may be a lot of high grades or no high grades at all, and the deciding factor is each student's performance as compared to established criteria used for grading, not the performance of the rest of the

class. In very large courses, especially introductory courses, even criterion-referenced grades may give the appearance of a normal distribution. The assumption in criterion-referenced grading, however, is that the standard of performance is technically reachable by all. Criterion-referenced grading allows you to evaluate how well each student has learned what you consider to be important for your course and thus in many educational settings is the more appropriate option.

Writing Exams

The first step in writing an exam is deciding what kind of exam to give. Class size often influences what format will be used, but it should not be the only consideration. Instead, review the course's educational goals and decide what kind of test will best reinforce them. This may mean using problems, short answers, or essay questions when possible. The following questions can help determine which kind of exam is most appropriate for a given situation:

- *What is the purpose of this test?* Much of the focus for the questions you ask will follow naturally from the course goals and objectives. Knowing what you hope to accomplish with a particular test can make its construction much easier.
- *What kinds of performance am I trying to evaluate?* It is often useful to think about precisely what a wholly masterful performance would look like and what the intermediate steps to that level of performance would be. Knowing which specific skills and knowledge you want to evaluate also greatly facilitates test construction.
- *What types of items are best for these objectives?* Generally speaking, the further away from the simple recall of information you get, the more appropriate open-ended test items become. Writing good forced-choice items to assess critical thinking, creativity, and application is a challenge. Similarly, essay exams are a relatively awkward means of assessing the depth of students' factual knowledge.
- *What time constraints have to be considered?* Two additional considerations in test construction are the time you will have for writing it and the time will you have for scoring. Obviously, it is time-consuming to score 200 essays efficiently and reliably. But writing good forced-choice items is also time-consuming.

You can make writing an exam a little less daunting by recording two or three possible test questions based on material just covered after each session. If you do this every day you should have a nice set of questions to use as a starting point for each exam. Some teachers also ask students to submit possible exam questions as homework and include effective ones in their pool of questions for the exams. When written in advance, questions can be carefully honed and revised to ensure that a lack of clarity will not affect the outcome of the exam. Effective essay exams consist of questions precise enough that students can understand what you expect and yet flexible enough to allow for a range of possible answers. Like

wise, well-written multiple-choice tests use clear, unambiguous language. If an exam is poorly written, syntax and language may reveal the correct answer to students who don't know the content, or worse yet, a poorly written question may obscure the correct choices to a student who does know the content.

Each form of exam—whether essay, multiple choice, or otherwise—has its own strengths and weaknesses. In general, multiple-choice and short-answer exams are time-consuming to prepare but can be graded rapidly. Essay exams, on the other hand, take less time to write but more time to grade. Mastery of factual material is often easier to measure with a well-designed multiple-choice exam, whereas an essay exam is generally a more effective mechanism for assessing critical and creative thinking. With consideration of your objectives and careful planning of the questions you ask, either type of exam is a useful method for measuring student achievement.

The following lists provide additional suggestions for writing short-answer, essay, and multiple-choice exams:

Tips for Writing Short-Answer and Essay Exams

1. Make sure the questions are worded clearly by reading them aloud to yourself. Try taking the exam yourself, or ask a colleague to look over the questions to check for any ambiguity or possible misinterpretations.
2. Pose problems or situations that are similar to those discussed in class.
3. Indicate the amount of time that should be devoted to each question, the approximate length of answer expected (e.g., a sentence, a paragraph, five paragraphs), and the number of points each question is worth.
4. When offering a choice of questions for students, limit the number of options to two or three.

Tips for Writing Multiple-Choice Exams[45]

1. Ask questions of significance in the subject matter.
2. Write questions in language appropriate to the level and subject matter of the course.
3. Paraphrase material from the book: do not copy verbatim.
4. Avoid giving the answer to one question in another question.
5. Write the stem of the question first, presenting a single problem as a question or incomplete statement. As you write the stem,
    - state the problem concisely but completely. Students should be able to understand the problem defined in the stem without looking at the response choices.

[45] In addition to these tips, we strongly recommend that you consult University Testing Services (UTS) if you are responsible for writing multiple-choice exams. UTS can provide valuable data to help you write useful and reasonable test items. See the directory in appendix F.

- avoid using the word "not" in the stem. If you must ask the question in a negative form, underline "not" to avoid confusion.
- avoid the words "always" and "never" in the stem.

6. After you write the stem, write the correct answer and then compose the incorrect choices. As you do so,
   - double-check that the best response is indeed the best response.
   - construct the response options so that knowledgeable students will recognize one answer as clearly correct and uninformed students will find the incorrect answers reasonably plausible.
   - write options using the same grammatical structure so that syntax will not inadvertently signal incorrect answers.
   - make sure all the alternatives are of relatively the same length, preferably as brief as possible.
   - check for inadvertent clues that might disqualify certain options, such as the words "all" or "never."
   - write the incorrect choices using language and terminology that are familiar to students so that the choices will seem plausible.
   - arrange options in a logical order if one exists.
   - distribute correct answers randomly among the possible positions.
   - write only as many alternatives as will make meaningful discriminations. Three choices may be as effective as four or five for some questions.

As a final step in preparing to give an exam, consider how you can help your students study. It is important to prepare the students for the type of exam they will take, either by describing the specific format or discussing sample questions in class. You might suggest strategies for studying and campus resources that can help students prepare.[46] Some teachers lead review sessions in or outside class, during which they discuss the logistics of the exam, ask students to brainstorm important ideas that will be covered, and answer students' questions about the material. A review session encourages communication about the exam between students and the instructor, and alleviates test-taking anxiety. As the following essay shows, encouraging students to study in groups can also have many positive benefits.

[46] For information about campus resources providing learning assistance, see the directory in appendix F. A useful study guide for students is Arthur W. Kornhauser's *How to Study*, 3rd ed., revised by Diane M. Enerson (Chicago: University of Chicago Press, 1993).

From the Student's Point of View

Chemical Engineering Made Easy[47]

ROBERT KLAFTER

Department of Chemical Engineering
Class of 1996

As a third-year student who, for reasons still unknown, is majoring in chemical engineering, I have taken many exams. There are many ways to go about studying for an engineering or science exam. I have tried several methods with varying levels of success (osmosis doesn't work). I will tell you the most effective ways I know to study for a science or engineering exam. My first tip is to make a crib sheet, whether or not you are allowed to bring one to the exam. By rewriting key equations, you accidentally remember some of them. It is also helpful, if you have the time, to condense your notes on 3 x 5 index cards. At the very least, read over your notes twice. If your notes are absolute gibberish, incomplete, or illegible, ignore them and study from the text. If the text is absolute gibberish, which some texts are, get notes from a friend. This leads to my second tip: study in groups.

There are two major advantages to studying in groups: (1) group members can help you understand ideas you are missing, and (2) you can help yourself by helping group members because the material is reinforced. Other people have different ways of viewing things than you do. Their perspective allows you to look at the material in a different way. The only drawback to group studying is you can lose your focus. While reminiscences and debates are interesting, they won't be on the exam.

My third tip is to review past exams, including exams taken earlier in the semester and exams of past years administered by the same professor. The older exam questions will not be on the upcoming exam, but it is still useful to know the format of the exam and the types of questions that will be asked. The tests of years past can also be used as practice if the course has not changed dramatically.

A word of caution: just because a test is open book or open note doesn't mean it's necessarily easy. One of the top ten reasons given by the American Institute of Chemical Engineers (AICHE) to become a chemical engineer is "to take open book, open note exams and still fail." The point is that you still have to study for these exams as much as you would for any other test. Take-home exams may sound easy, but they are usually twice as tough as ordinary exams.

If you heed any of the above advice, you will probably be ready for your test. If you still get a 50 on the exam, don't panic—there are usually generous curves.

Academic Dishonesty

Plagiarism and cheating are considered to be very serious offenses at the University.[48] Although students are not usually subject to severe penalty with a first offense, it is best to report all instances of academic dishonesty in case the student is following a similar pattern of behavior in another class. If you are a TA being supervised by a faculty member, report the suspected incident immediately to that faculty member. Otherwise, check with your department chair to determine who should be informed about the situation.

[47] Originally published in *Learning at Penn State: From the Student's Point of View*, (1995), available from CELT.

[48] The University policy regarding academic dishonesty is outlined in the Academic and Administrative Policies and Procedures Manual (*http://www.psu.edu/dept/oue/aappm/aappm.html*).

Obviously, the best approach to academic dishonesty is to try to prevent it from happening in the first place. Sometimes students are accused of cheating when, in fact, they believed they were operating within the letter of the law for a particular course. For example, many students are unfamiliar with standard procedures for how and when to quote or give credit to others. When you clearly specify when students may collaborate with their fellow classmates as well as how and when they must give credit to others, you avoid many misconceptions. (In appendix C you will find a handout one department has developed to inform students about plagiarism and its consequences.)

As Wilbert McKeachie points out, another way to prevent cheating is to reduce the anxiety that often leads students to cheat.[49] For example, you can diffuse the pressure of any one exam by giving several exams and/or graded assignments rather than just a midterm and a final. Some teachers also allow students to drop one exam from their final grade. Not only does this remove students' fear that one bad day can ruin their grade, but it also minimizes the need for make-up exams.

Finally, perhaps the most obvious prevention is to reduce the opportunities students have to cheat. Simple gestures such as checking IDs as students hand in their exams or strolling the aisles during the test are often enough to dissuade some students from cheating. Barbara Wade and Richard Stinson (Agricultural Education) also recommend the following additional precautions:

- Number exam forms sequentially so that you can easily determine if any are missing.
- In large classes, use several computer-scrambled sets of questions with corresponding computer-created grading sheets.
- Insist that all books and papers be placed on the floor before the test begins. Some teachers alsoask students to remove hats or ball caps during an exam.
- Use an alternate seating arrangement during the exam to frustrate potential cheaters, or assign seats to break up collaborative efforts at cheating.
- Ask students to leave the exam face down on the desk when they leave. This allows you to collect the papers sequentially to detect possible collaboration between neighboring test takers and to check that no exams have been removed from the room.
- If bluebooks are used, ask students to turn in a signed, blank book at the class meeting prior to the exam. You can then verify that they are blank before redistributing them just before the exam.
- Walk around the room during the exam. Obvious monitoring convinces borderline cheaters that the risks may be too great. In large classes, several proctors or TAs may be needed to monitor.
- After the exam, keep papers locked up while you're grading them. You should record scores in ink, or if you use a computer to record grades, make sure the disk is secure.
- Record grades before returning exams to students.

[49] Wilbert McKeachie, *Teaching Tips: Strategies, Research, and Theory for College and University Teachers*, 9th ed. (Lexington, Mass.: D.C. Heath, 1994), 96.

- Give make-up exams that are different from the regular exams, and inform students of this policy from the beginning of the course.

Grading Short-Answer, Problem-Solving, and Essay Exams

Before you begin grading, it helps to read through a few exams to get a general idea of the range of answers. The next step is to establish a set of specific grading criteria. What would an A answer look like? What about a C answer? What characteristics distinguish an A from a C or a B? When grading, grade all responses to a single item at one time. Give global grades at first, trusting in your overall reaction to the general quality of an answer.

When grading essays, consider all aspects of the papers such as content, argument, and the quality of writing, but you needn't try to give a grade to each aspect. Splitting grades into categories like content and organization can cause more problems than it solves. While they are the parts that make a whole, a good essay is often greater than the sum of its parts. Also, avoid merely giving points for each item or fact mentioned. In effect, doing so turns an essay test into a multiple- or forced-choice exam, testing only memory and recall.

Once they have given a global grade, many teachers find it useful to sort the exams by grade category and reread each as a group—for example, all of the B exams—to see what characteristics they share. This practice gives you a chance to fine-tune your grading and make comments. The following strategies can make the grading of open-ended test items more efficient and effective:

1. Have students write their names on the back of the paper or blue book so you can grade anonymously.
2. Quickly read through some of the exams first to get a feel for the range and level of responses.
3. Construct a set of grading standards before you begin to grade.
4. Grade all the responses to each question together, then shuffle the papers and grade responses to the next question in a different order.
5. Give written comments—both positive and negative—to help students learn from the evaluation.

Finally, before you return the papers to the students, you might make notes for yourself about them. Dennis Shea (Health Policy and Administration) records on note cards a description of the strengths and weaknesses of each student's performance, creating a record of the student's progress in the course. These cards let him compare each recent performance with past assignments, thus allowing him to comment on the student's development toward the goals of the course.

Commenting on Student Papers

Comments on essays, problems, reports, and other written assignments should teach students rather than simply justify the grade. Writing on student papers is one of your few opportunities to give individual instruction. In the following essay, Marie Secor discusses the importance of this aspect of instruction, explores some of the relevant issues of grading, and analyzes the various roles we play as teachers when we grade.

Grading as Teaching

MARIE SECOR

Associate Professor, Department of English
Graduate Teaching Award, 1996
Alumni Teaching Fellow, 1989

For new teachers—and even for experienced ones—grading papers can be a chore. One is faced with regularly recurring piles, impatient students, and the certainty that if a new batch comes in before the preceding one is returned it will take forever to dig out. We all know stories—they are part of academic folklore—about the teacher who never seemed concerned about grading all semester and who mysteriously disappeared just before the end, leaving behind desk drawers overflowing with a whole term's worth of pristine, ungraded papers. I would like to suggest that it is happier, healthier, and more helpful to think of grading as a challenge (even a rewarding one), an opportunity to engage all the skills one develops and calls on in the more direct interaction of the classroom, an extension of the conversational art of teaching. Grading is not a mechanical activity any more than teaching is. In support of that view, I would like to offer a series of statements about grading. They range from very general principles to very specific advice, and that is the approximate order of presentation. Some of the advice is technical or procedural and some is philosophical.

I will begin with a bit of technical advice about time management. Imagine yourself faced with that first set of papers. What is the first thing you do? Your impulse might be to pick up that first paper on top of the pile and spend an hour and a half taking it apart, noticing everything that is wrong with it, and wondering how you are ever going to get the rest of the job done. My advice is, don't begin grading right away. Take an hour or so and begin by reading quickly through the whole set of papers, just skimming to get a sense of what the batch is like. This procedure will help you establish realistic expectations of the entire class, it will give you an idea of what the range of quality is, and it will tell you what kinds of things—both good and bad—recur, so you will know what to look for and emphasize in your comments. It also has the benefit of focusing your attention on what students are saying in their papers rather than what they are doing wrong. Taking that one hour to skim through a set of papers will save you many hours of obsessive aggravation later on. You may even want to read with a pencil in your hand, marking or noting things that you want to comment on later or making quick comments or corrections when you find it irresistible.

The first, and perhaps most important, philosophical point: when you are commenting on papers and grading them, think of yourself as having four distinct roles. First—not in importance but in obviousness—you function as a kind of editor, whose job it is to see that a clean text has been produced and that the writer learns how to produce a clean text. Second, you are a judge, an evaluator who assesses strengths and weaknesses. In this role, you have an obligation not only to judge but to present the reasons for your evaluations. Third, you are a coach, who offers a diagnostic analysis of the student's efforts and directions for revision and improvement. Finally—and I think most important—

you are a reader, a human being who reacts to what she reads, a thinking person whose expectations are either fulfilled or violated, who responds with interest to what is being said. All of these roles are functions of a teacher.

In order of importance, your editorial role is least significant—unless you are indeed preparing a manuscript for publication or consultation by further audiences. The principle to keep in mind here is that whenever you make editorial corrections, you should make them as professional editors do and as you would like to have your own work edited—carefully, consistently, tactfully, without making a big deal of every little item you fix. A misspelled word need not be treated as a moral failing, and a comma error is not a sign of illiteracy. In your role as judge, it is most important not only that you make good judgments but that you keep in mind what your purpose is in evaluating: are you trying to get the student to do a better job next time, to make substantial revisions on the work at hand, to explain principles that will lead to better papers next time? Coaches need analytic understanding of the elements of competent performance as they prod, encourage, and direct students toward it. Most of my remaining comments focus on what I consider the teacher's most important role as grader, that of reader, the thoughtful respondent who takes seriously whatever the student is saying—and expects the student to do the same.

THE PURPOSE OF COMMENTING ON PAPERS

Remember that the purpose of everything you write on a paper is to give useful advice. It is not to show that you know your stuff, or that you are very smart or very conscientious, or even to show that the student doesn't know enough. All of these conditions may be true, and there are many other true things than can be said about every paper you read, but they don't all need to be said. For example, when she was a college freshman, my daughter had a student writing fellow comment on her first paper in a history course. He wrote over a page and a half, single-spaced, in response to her five pages, telling her that she had the wrong kind of style for the discipline of history, that she needed to relate her analysis of contemporary Argentine politics to the larger context of South American political movements, that a great deal of history she didn't know would have been relevant to consideration of her subject. Instead of being impressed by the amount of time, effort, and expertise he had brought to his grading, she was left helpless because she was only a first-semester freshman at the time, and even though what the grader said may have been true, it was not useful advice for the task at hand, which was the immediate revision of that paper. Advice is not useful if the student is not at a stage of development that would enable her to follow it.

HOW MUCH TO SAY

Like all of us, students can profit from only a limited amount of good advice at one time. Doubling the dosage does not produce a cure twice as fast. If a student gets back a paper and learns one or two important things to be careful about on the next one, specific things to do better, he has learned a great deal. It is not useful to tell students every single shortcoming of a paper; it is not even useful to mark every single error, every misspelling of the same word, nor is it helpful to fill pages with detailed directions on how to produce the paper you would have written. It is very discouraging to get a paper back on which the instructor has written more than the student because it puts the emphasis in the wrong place, on the instructor's effort rather than the student's. A sea of red ink is not a point of pride. In fact, I always advise new teachers never to use a red pen. The more neutral-looking the commentary, the better.

LOCAL AND GLOBAL COMMENTS

There are two kinds of comments you can make on papers, local and global, and it is helpful to consider them as serving different functions. Local comments are the kind you make in the margins or between the lines as you read a paper, and it is useful to see them as documenting your evolving response as a reader. Here is the place to react as you read, making remarks like the following: "this is nice and clear," "I lose the train of thought here," "this is muddy," "I could use an example here," "that's a funny story," "I had to read this paragraph three times to figure out what you were getting at,"

"what's the point?" "this reminds me of something important or interesting," etc. Comments like these convey the point that it is the writer's obligation to be clear and interesting and help the reader through the text. That's an important lesson for the student to learn, that there is a human being reacting, being puzzled or delighted or infuriated, as she is reading this paper. Your local comments can also serve an editorial function, suggesting alternative structures or wordings, commenting on effective or imprecise word choice, pointing out neat sentence structures or disentangling messy ones. If you use the local comments to convey your reactions as a reader, then the global comments at the end of the paper can make judgments, summarizing strengths and weaknesses that have already been pointed out, discuss issues that have been raised in a stimulating way, and offer coaching advice. Local comments offer editorial advice and reader reaction; global ones summarize, evaluate, and convey the coach's directions for improvement.

POSITIVE AND NEGATIVE COMMENTS

No matter how hard it may be, it is essential to make some positive comments on a paper. That is not just stroking or potential dishonesty. Students learn from being told what they did right just as much as they learn from being told what they did wrong. Just as a batter profits from being told that when he closes his stance and lowers his shoulder he hits better, so does a student profit from being made more conscious and more in control of what she may be doing unconsciously. In fact, one of the main jobs of a teacher is to make students conscious of matters that they may be utterly unconscious of, even if they are doing them correctly. So your reader's comments should have some good things to say, and the final comment should find something to praise about a paper: Is there a cogent and clever sentence among a string of bland ones? Is the introduction pretty good, though the whole paper falls off badly after that? Is there more to the student's idea than the student thought? If the organization is poor, is the basic content acceptable? If some main points have been scantily treated, is there potential for development? If the language is imprecise and fuzzy, is the basic idea worth pursuing further?

When you have to make negative comments, it is important not to insult the student in doing so, no matter how frustrating the performance. No student should be accused in writing of being lazy, illiterate, unambitious, or incompetent, no matter how obvious that conclusion seems to you. The paper at hand may have serious shortcomings, its development may be wholly inadequate, its expression unacceptable, and you may be very disappointed over this state of affairs, but the insult should not be directed at the student, nor should the language of personal insult be applied to the paper. You can say "This won't do at all," "This is entirely unacceptable," "This is inappropriate," "This is very poorly argued," "This is an incoherent paragraph"—any strong commentary is fine about the substance but not about the student. Not "You have been lazy in executing this assignment," not even "This is a lazy paper." Not "This is ignorant," and certainly not "You are ignorant." Not even "This is unambitious" or "This is illiterate." Students take such language, even when predicated of their paper and not themselves, as insulting, as you would if you were on the other end of the grading process. To begin with, you may be wrong in your accusation: what looks to you like laziness may be bewilderment. Or, just as likely, you may be right, but saying so won't do any good. We all need a kick in the pants sometimes, but you have to know the recipient very well before administering it.

EXPECTATIONS

The comments you make on a paper should make clear what your expectations are as an interested, serious, and thoughtful reader. It is helpful to make comments like the following that indicate what you were expecting and how you reacted when you got or didn't get it: "I got to the end and wondered where your consideration of *x* was"; "I expected to see this point treated earlier"; "I was surprised to find that you didn't consider the arguments on the other side"; "I needed an example here and was pleased to find it"; "Your opening paragraph seemed to promise that you would develop this argument in this way—what happened?" Such comments help students gain a sense of a real audience reading their papers.

COMMENTING ON SUBSTANCE

It is a mark of intellectual respect for the student and the paper to comment on its content or substance. All your remarks should not focus on formal features or style or organization or even on issues concerned with the technique of argumentation. The student, no matter how much a beginner, is saying something about a subject, and the instructor owes it to the student to respond to what is being said. A paper is like a turn in a conversation; we wouldn't like it if someone we were talking to did nothing but correct our errors and deficiencies. It is hard to expect students to take their writing seriously if we do not set an example.

COMMENTING ON STYLE

Although it is hard to resist, do not rewrite the paper for the student. It is the student's paper, not the teacher's. Make a suggestion—or, better yet, suggest several alternatives—if you need to demonstrate how to do something that you suspect the student doesn't know how to do, but don't simply cross out and rewrite. If a paper is wordy and repetitious throughout, don't black out whole passages. It is more effective to use brackets and ask in the margin whether it might be preferable to delete, or if there would be any loss by deleting. It is very hard to refrain from substituting your own style for the student's, especially when you know your own version is better. You can, however, offer alternatives: "Do you mean *x* or is *y* a more accurate word?" "What if you moved that sentence to the beginning of the paragraph?" "Any loss if you omit this sentence or phrase?" In making stylistic corrections and suggestions, the point is to increase the students' awareness of options and alternatives, to help students make conscious, informed choices out of what may be unconscious habits.

MAKING SPECIFIC COMMENTS

It is just as important to praise specifically as it is to identify specific faults or deficiencies. Competent students need just as much teaching as less competent ones. It does little good to offer vague praise like, "You raise some good points in this paper." It is far better teaching to say what points you thought were good, what was interesting or well done, and why. Positive evaluations need to be supported and argued for as much as negative ones. It is also helpful if your final comments refer back to some of the remarks you made in the course of reading the paper: "As I said on page 2, you need to tell the reader why you set up your experiment this way"; "As you can see by my comments, you need to define your terms more clearly"; "Notice where I got confused on page 2; I never recovered after that"; "Your first paper had trouble with the conclusion; this one seems much more pointed." It is always good to take note of what has happened as the student progresses through a course, especially if there has been marked improvement.Separate Commenting from Grading

It is always a trap to think of final comments as justifying the letter or numerical grade you have assigned to a paper. A grade, letter or number, is a symbol that represents how a paper stacks up against an ideal of perfection; final comments can summarize strong and weak points in the paper, tell students what is well or poorly executed, offer advice and techniques for revision or for future papers, but in no way do your comments have to explain why you assigned a paper a grade of C instead of B. If you do your judging, coaching, and discussing in your final comments, the grade should look reasonable when placed next to them, but in no way should your comments launch an argument over the grade, justifying a shade of evaluative discrimination that someone else may challenge. In fact, it is often a good idea to do commenting and grading in two separate passes over a batch of papers.

Do not give separate grades for form and content. It trivializes both. If you say that the mechanics are terrible but the paper is otherwise wonderful, you cast doubt on your own judgment. The best way to handle this kind of problem is to indicate the kind of frustration it induces in you as a reader. If you can't get through a paragraph without puzzling out a half dozen misspellings and you get confused because sentence boundaries are not clear, the student should know that you are having trouble focusing on what is being said and that such distraction seriously affects your

evaluation, which is reflected in the grade. If the student has not used the form of documentation preferred by your discipline, you can indicate that the effect is unprofessional and that an amateurish effort will not get a high evaluation. Interestingly, the form/content problem seldom arises in the other direction: teachers are rarely tempted to give split grades when the mechanics are flawless but the paper empty.

TECHNOLOGIES FOR GRADING PAPERS

I don't have very much advice about whether to write up comments on the computer or whether to use special interactive programs that allow you to insert comments into the text that the student can then access and correct on the word processor. Some people work effectively with such techniques, while others are more comfortable with a pencil. The advantage of the pencil or the pen is that you can write wherever and in whatever size you want to; it's a wonderfully adequate and flexible technology for some purposes. The only principle I have is that it is a bad idea to sprinkle papers with codes and symbols that the students have to decipher—or, more generally, that it's a bad idea to employ any kind of marking or commenting system that requires additional steps for a student to read. It is better to note a persistent error once, suggest briefly how to correct it, and say, if necessary, "You do this all the time," than to devise a meticulous and mysterious code to identify every occurrence or slight variant. Students should not have to go through elaborate procedures to find out what you thought of their paper. Some instructors like to comment on tape cassettes because they think it saves time and is friendlier; I think written work calls for written commentary in response and that we should be modeling writing if we are trying to teach it.

In conclusion, grading papers is much like every other aspect of teaching. It is an opportunity to find out what the students in a class are thinking and learning, and it requires just as much patience, fortitude, and good humor as everything else that a teacher does. It is only mechanical when the task students have been asked to perform is mechanical; at times, we give quizzes to find out whether the class has done the reading or learned some specific information. Teachers don't need much advice about grading those papers. But most of the time our written assignments ask for more. We want to see some significant analyzing and synthesizing going on, we want to see what students can make of what we have taught, whether they can apply it to new and challenging situations. In these circumstances, grading is an important extension of our classroom teaching. We interact with students in groups in the classroom, individually in conference and conversation, and in writing when we grade their papers. The conversation we begin in the classroom is brought to fruition in our commentary on student papers. We correct like editors, assess like judges, prod like coaches, and react like idealized readers, both critical and sympathetic. All of these activities are essential to teaching.

Because it is a crucial instructional activity, grading and commenting on student work—whether essays, lab reports, or problem sets—is a difficult and time-consuming task. The question is how to do it well while still keeping the task manageable. In order to help you do so, the following list summarizes many of the suggestions made throughout this chapter:

1. Quickly read the entire paper once before making any comments. This allows you to select with better judgment which things merit comment.
2. Don't try to "fix" the paper. Your job is to show students how they can revise their own papers.
3. Be selective in your comments. If you try to comment on everything, you will simply overwhelm the students. Instead, focus on a few points in each paper, tying them into the objectives of the assignment. Less skillful students in particular will benefit if you deal only with the more important problems at first, giving some direction for improvement and leaving smaller problems to be dealt with later.

4. Correct a particular type of mistake only once or twice. Explain why it is wrong, and ask the student to find and correct the other instances. And be sure to point out any places in the paper where the same situation is handled correctly.
5. Write clearly and legibly and avoid using symbols. Students shouldn't have to translate your comments. If you regularly work on computers, try typing out final comments and attaching them to the paper. For those accustomed to writing at the keyboard, this method can be much faster and allow more thorough comments than can be scrawled on the bottom of the page. It also provides a good model for your students, shows them that you consider their papers seriously, and is simply easier to read.
6. Summarize at the end to give students a focused idea of what to work on.
7. Comment just as thoroughly on an A paper as you would on a D paper. Competent student writers also need feedback to help them continue to develop as writers.
8. Balance negative comments with positive ones. Understanding which parts were effective andwhich were not will help students learn how to improve their work.
9. When the problems in a paper are complex, invite the student to meet with you for further comments.
10. Refer constantly to your grading criteria while commenting on papers.
11. Comment on all papers, and then go back and assign grades.
12. Try incorporating peer review or rough draft workshops into your class. Many times fellow students can make suggestions for revision that you would have made but which are easier to respond to and learn from when offered by a peer.
13. Have students write a brief note about their paper's thesis, purpose, and audience to hand in with the paper. This gives you a context for grading the paper and means they will be more receptive to the comments you make.
14. Refer back to other essays they have written and to related exercises they have completed in class. This shows that their work is important to you and also reaffirms the relevance of other assignments to course goals.

V. Collecting Feedback to Improve Teaching and Learning

At the heart of effective teaching is an ongoing process of self-evaluation and obtaining feedback from others. While testing is a good way of measuring and evaluating *what* students have learned, it is less effective at assessing *how* students are learning. In fact, other kinds of data are more useful than exams for monitoring student progress and teacher effectiveness throughout the semester. When data are collected during the semester, when suitable kinds of questions are posed, and when the procedures used provide sufficient detail to help teachers determine what is and is not working, the result can be extremely helpful in improving teaching and learning. There are many different kinds of data you can collect, some less formal than others. But generally speaking, those data that ultimately prove to be the most useful share the following characteristics: they are timely, systematic, and descriptive.

In this chapter, we will describe several methods of gathering, analyzing, and responding to feedback primarily from one source—students themselves. Through classroom assessment activities and more formal feedback questionnaires, instructors gather the feedback that helps them to assess and improve both teaching and learning. In addition, many teachers find these types of assessment activities to be excellent opportunities for asking students to reflect on and take responsibility for their own learning processes. Obviously, assessment procedures can be used at any point during the semester, but they have the greatest potential to improve teaching and learning when used early. You might consider administering at least one of these feedback instruments as early as the third week of class. These activities, tried and tested in Penn State classrooms, work best when accompanied by careful self-evaluation—a topic we will discuss in greater depth in the next chapter.

Using Classroom Assessment Techniques

Unhappy indeed are the moments when we discover—often while grading the final exam—that what our students have learned is not at all what we thought we were teaching. Faculty, and for that matter students, need effective ways of monitoring learning throughout the semester. Although individual instructors

often do invent, discover, or simply stumble upon strategies that work, these informal and often serendipitous discoveries rarely become a matter of public record. Thus, a few years ago, Thomas A. Angelo and K. Patricia Cross compiled a volume[50] describing strategies that college teachers have found useful and that can be used as models for asking the fundamental but often elusive questions "What are your students learning?" and its corollary, "How effectively are you teaching?"

Angelo and Cross gathered together 50 structured activities—classroom assessment techniques—that instructors have used to observe what goes on in their classrooms and in the minds of their students. The data that faculty gather using these classroom assessment techniques can be immensely useful for improving teaching and learning in a variety of ways. For example, such activities can help students learn how to study, can encourage teachers to analyze objectively what transpires in the classroom, and can guide students in a self-analysis of their own learning processes. Moreover, the activities with the most widespread appeal and utility are also among the simplest to modify, use, interpret, and respond to. In fact, many Penn State teachers have modified the classroom assessment techniques described in this section to suit the needs of their own classes.

As with most other decisions about teaching, responsible and effective use of classroom assessment techniques begins with a clear understanding of purpose and expected outcomes. As you read through the classroom assessment techniques described below, consider which have the most potential for a course you are teaching. Will you need to modify the basic procedure to suit your particular situation? The most effective use of assessment activities comes about when teachers tailor the techniques to the type of data they are trying to collect from their students. Also, decide whether or not student performance should be anonymous. Although Angelo and Cross recommend that classroom assessment techniques be ungraded, some faculty at Penn State have found it more successful, especially early on, to "count" them. As little as 1% of the final grade (perhaps with a grading scheme of check, check plus, and check minus) will encourage students to take them seriously. However, even if the activities are factored into the grade in some way, remember that classroom assessment techniques seem to work best when they are viewed as a source of feedback and not as a system for evaluating student performance. Achieving the right balance may take a bit of experimentation.

When you design the activity, keep it simple. Don't ask for more data than you need, or for more data than you are willing to use. Read through the completed questions or tasks you have written—or better yet have someone else read them—and check to see that they will in fact solicit the kinds of information you are looking for. As you introduce the activity to the class, let your students know why you are using these techniques and how the information you collect will help them. Even a simple statement

[50] Thomas Angelo and K. Patricia Cross, *Classroom Assessment Techniques: A Handbook for College Teachers*, 2nd. ed. (San Francisco: Jossey-Bass, 1994).

about how such information makes it easier for you to plan subsequent class sessions may be enough. Genuine but judicious explanations of the technique and its purpose seem to work the best.

Once you have collected the students' responses, sort and analyze the data. Look for any patterns, common responses, and bimodal distributions. Check to see if your students' responses match your original expectations. For the most part, student responses will probably sort easily into a few general categories. If you have a large number of responses (75 or more), begin your analysis with a sample of the total set of responses (but be sure it is a random sample). Then, when you have analyzed the data, share at least some part of that analysis with your students. Let them know what surprised you about the responses and how the activity will affect their experience as learners in the classroom. Students seem to benefit greatly from knowing how you will be using the information they provided you and, perhaps more importantly, how they can use their responses as a guide for improving their skills as learners.

Finally, don't feel you have to rush into using these techniques in every class or during every session. Begin slowly. And if you cannot see how a technique will work in a particular class, don't force it. Premature or frivolous use of these activities can actually be counterproductive. The basic descriptions below have already served as a source of fruitful ideas for many Penn State faculty. There is much richness in them. But do avoid the only real danger in classroom assessment—too much data and not enough time or experience to know what to do with those data.

Background Knowledge Probe

Asking students for general information about their background and preparation for a course is a fairly common practice among college teachers. *Background knowledge probes* are simple questionnaires that extend this activity to include a few focused questions about those concepts that students will need to know to succeed in the course. Asking questions of this sort can help to highlight important concepts for the students as well as to inform the instructor about the students' knowledge and abilities.

Background knowledge probes can be used at the beginning of a course, at the start of a new unit or lesson, or prior to introducing an important new topic. Once collected and analyzed, the data can be extremely useful when planning subsequent sessions or units of the course. Although many classroom assessment activities can be done for credit, it is usually best to make the background knowledge probe an ungraded activity. You might even use anonymous questionnaires to determine the general level of preparation in the class rather than collecting individual information. After students respond to your questions, you can discuss its results in class to give each student an idea of his or her own preparedness. Whether collected anonymously or not, the data from a background knowledge probe can help you guide students to the appropriate resources for any supplementary assistance they may need.

Misconception/Preconception Check

Sometimes, learning what students know is not as important as learning what they *think* they know. In any discipline, students are likely to begin a class with some incorrect assumptions about the subject and the field. Many teachers uncover these misconceptions with a *misconception/preconception check.* This classroom assessment activity is similar to the background knowledge probe, but instead of asking only about students' prior knowledge, it focuses directly on assumptions or beliefs that may actually hinder learning in the course. Instructors find this activity particularly useful in courses dealing with controversial or sensitive issues, or those in which students may have developed intuitive but inaccurate theories. Discovering and addressing these inaccuracies ahead of time will save considerable frustration later on.

When preparing this kind of activity, begin by asking yourself the following questions: What misconceptions or preconceptions might be commonplace among students who take this course? Which of these are most likely to interfere directly with learning? How can I deal with these misconceptions once they are identified? You may know from prior experience what kind of assumptions students bring to the course, as well as their effect on how students learn. Perhaps the most challenging aspect of the misconception/preconception check is finding effective ways to change deeply held—yet mistaken—beliefs.

Generally speaking, misconceptions are not dislodged simply by admonishing students to stop thinking that way. Rather, students typically need to deal directly with their preconceived notions before they can be successfully led to an understanding of why those beliefs are untrue. For example, many college students believe that it's cold in winter because the earth is further from the sun, even though they have almost certainly been taught otherwise. In this case, they could be asked to develop an explanation that accounts for other facts, such as the difference in seasons in the northern and southern hemispheres. Such an activity may involve nothing more than sorting the responses to a set of questions, discussing the general types of misunderstanding with the students, giving them a chance to explore the limitations of those misunderstandings, and then letting them respond to a new set of problems with an opportunity for additional feedback and self-correction.

Minute Paper

Finally, the most common assessment technique used in classrooms at Penn State and elsewhere is the *minute paper*. This activity is a quick and extremely easy way to collect written feedback on what students have learned, with only minimal investment of time and energy. The instructor simply stops class two or three minutes early and asks students to respond briefly to the following two questions: "What was the most important thing you learned during this class?" and "What important question remains unanswered for you?" Despite their simplicity, minute papers assess more than mere recall. To select the most important or significant information, learners must evaluate what they recall. Repeated use of minute papers helps students learn to focus more effectively during lectures.

As we discussed in chapters 2 and 3, Penn State teachers successfully use minute papers in classes both large and small, whether their primary teaching method is lecture, discussion, or something in between. In fact, the minute paper's biggest strength may be its adaptability—it lends itself to countless variations and is simple to use in any discipline. For example, you can encourage students to give more substantive responses by asking them to write their minute papers as if they were communicating the most important point from that class period to someone who had been absent. Another variation is sometimes called the *muddiest point*, which directs students to describe what was most confusing about a particular lesson or topic. Instructors at Penn State find the minute paper appealing because it is a fast, effective way of gathering useful data.

Besides the minute paper, the misconception/preconception check, and the background knowledge probe, there are many other classroom assessment techniques with diverse uses for different fields. They all spring from one purpose: to gather useful information about the joint processes of learning and teaching as they take place in the classroom. These techniques have been developed by teachers who are trying to answer the question, "How are my students learning?" In answering this question, teachers adapt these activities for their own courses.[51]

One example of a successful development of classroom assessment techniques comes from John Lowe (Chemistry). He has developed a series of periodic assessment activities that he uses to collect information about how his students are learning, as well as to provide an opportunity for their own self-assessment.[52] He seeks feedback early in the course—as early as the first day—with a questionnaire asking students to describe their study habits and to predict how much time outside class they expect to spend on their coursework. This questionnaire is followed throughout the semester by post-exam questionnaires that ask students to reflect on their preparation for the exam, how this preparation affected their performance, and what they plan to do differently for the next exam. Lowe reports that this series of assessment activities helps students understand the broader learning goals of the course and encourages them to evaluate whether or not their learning practices are enabling them to achieve these goals. Other Penn State teachers have modified Lowe's approach for their own classes, and report that this assessment technique is an effective way to encourage students to take responsibility for—and improve—their performance in a class.

Collecting Midsemester Feedback

Classroom assessment techniques, although very useful for gathering day-to-day feedback throughout the semester, may not be as effective at answering some of your broader questions about how a class is going. To collect feedback on issues such as pacing, general comprehension, student attitude and interest,

[51] For information about using other classroom assessment techniques and adapting the ones we have discussed here, consult *Classroom Assessment Techniques* or call CELT.

[52] For a complete description of Lowe's approach to continuous assessment, and samples of his questionnaires as well as those of teachers who have modified his approach for their own classes, contact CELT and ask for "Assessment that Promotes Learning."

and participation, teachers find that a more formal, systematic type of assessment works best. While course evaluations provide some insight on these topics, it's a good idea to collect feedback while there is still time to respond to it rather than find out only at the end of the semester how students felt about the class. For this reason, many instructors choose to administer a midsemester feedback activity at some point—or several points—during the course. They have discovered that while practice is necessary for improvement, in teaching, as in other complex fields of endeavor, practice alone is not sufficient. Rather, it is the combined opportunities for practice, feedback, and revision that lead to the development of skill and expertise.

There are many possibilities for collecting feedback from students during the semester. Your choices will depend on what kind of feedback you need and what you plan to do with it. If you want a broad, general picture of how the class is going, one good option is to use a standardized, machine-scanned form. For a more in-depth, detailed view of your course, an open-ended, teacher-designed form would work better. Some teachers tailor their feedback activities by combining a standardized form with supplemental or open-ended questions.

Machine-Scored Questionnaires

A machine-scored questionnaire is an effective method of gathering midsemester feedback, particularly for beginning teachers and those who teach large class sections. Sometimes, new teachers are unsure about what questions to ask their students at midsemester and would prefer to use a well-established instrument. For teachers of large class sections, the prospect of reading and interpreting hundreds of hand-scored or open-ended questionnaires can be fairly daunting. In such situations, a standardized questionnaire can be an effective way to begin the process of obtaining feedback from students.

One example of such a questionnaire is the 40-item machine-scanned form that CELT has distributed for well over a decade. Questions on this form cover major categories of teaching, such as organization, group interaction, and examinations. The form also includes space for nine supplemental forced-choice questions that a teacher may choose to ask.[53]

While a machine-scanned form can provide some useful feedback about how a class is going, it can also leave many unanswered questions. For example, if students respond that an instructor discusses current developments in the field only "moderately well," the instructor still does not know which aspects of the field students believe are being overlooked. Similarly, if some students indicate that they are not encouraged to express their own ideas and/or to question the instructor, it remains unclear what, if anything, the instructor might do to encourage more participation. You may thus find it necessary to follow up this activity by asking some open-ended questions to gather more specific information.

[53] If you would like to use this questionnaire, CELT will supply forms for your students, an instructor's self-evaluation form, directions, data analysis, and an optional consultation.

Teacher-Designed/Scored Questionnaires

Often, as teachers become comfortable with the process of gathering midsemester feedback with a machine-scored questionnaire, they begin to think of changes they would like to make in the form, and specific questions they want to ask their students. Using the section for supplemental questions on the machine-scored form allows some freedom, but many teachers ultimately decide to supplement or even replace the standardized form with their own questionnaire.

Designing your own questionnaire, especially one that includes some open-ended questions, can be an extremely effective way of obtaining feedback if you ask questions that solicit moderately focused responses. Very broad and general questions (e.g., "What do you like most, or least, about this class?") may result in vague or irrelevant responses ("I don't like the lectures," "I like your yellow shirt"). In contrast, the kinds of questions that ultimately prove to be the most useful encourage students to describe specific behaviors that are working in a specific instructional situation. For example, focused questions like "What kinds of comments on papers and quizzes do you find most helpful? Least helpful?" will typically elicit useful feedback, such as "I don't understand the symbols you use in your comments." Some students will also offer very simple and concrete suggestions for how to make things work better, such as "Leave the overheads up longer so we can copy from them." A sample questionnaire of this sort is included in appendix D.

Open-ended questionnaires are also an effective way to target specific aspects of a class. For example, if you've recently made a change in your course, such as incorporating technology, you can ask specific questions to measure the impact of that innovation and what, if any, problems students are having with it. Early, structured feedback in such a situation is particularly valuable because without it you may be unaware of the problems your students are facing until it's too late to do anything about them. On the other hand, if you ask fairly focused questions about how the change is working, your students may suggest improvements that you will be able to implement right away. One basic guideline for constructing open-ended questions is to ask only about things you are seriously interested in getting feedback on and/or things you would be willing to change if change seems warranted.

Yet midsemester feedback is not merely an opportunity for students to tell you what you are doing right or wrong. Teachers who use open-ended questionnaires often add questions asking students to examine and reflect on their own contributions to the course, thus encouraging them to take responsibility for their own learning. Like John Lowe's post-exam questionnaire, such an activity can underscore your expectations for student commitment to the class. For example, if you ask students to comment on the positive and negative aspects of in-class discussion, you might also ask them how often they complete all of the required readings before coming to class (every day, most days, about half the time, seldom, or never). Linking the success of the discussion to their reading habits as well as to your abilities as a discus

sion leader underscores the joint responsibility for what happens in the classroom. Students tend to be surprisingly honest when asked how much of the reading they complete, and asking them to reflect on their own contribution to the class encourages more reasoned and useful responses to the other questions on the midsemester feedback survey.

Analyzing Feedback

Once you have gathered the feedback from your students, you must analyze and interpret their responses to your questions. It is useful to begin your analysis by reflecting briefly on how you expected students to respond to your questions. It may help to fill out a questionnaire yourself—in fact, if you used a machine-scored feedback form, you might already have filled out the instructor's self-evaluation form. Then, as you read your students' responses, note how they compare to your own. Reflecting on the response you expected will put things in perspective and give you a sense of how accurately you are "reading" the class through other kinds of feedback, such as nonverbal cues, questions during class and in office hours, and attendance patterns. It can be surprisingly difficult to read such cues accurately. Often, teachers are relieved to learn from their written feedback that the criticisms of a few vocal students are not representative of the feelings of the entire class.

As you read through your students' responses, begin by getting an overview of the data. Do not become obsessed with a few negative comments—it's all too easy to be misled by one or two extreme responses. Outliers may deserve critical attention, but before you ponder them for very long, determine how representative they really are. A good first step is to tally all of the responses so that you can see the big picture. If you used a machine-scanned form such as the one provided by CELT, you will receive a printout of the results showing the number of students who chose each answer, and the average responses for the entire class. However, even if you used an open-ended questionnaire, you can tally the responses to get an idea of general trends in your students' answers. Once you've done so, consider whether the overall picture is relatively consistent or if there are clear differences in how students are experiencing the course. If differences exist, think about what could account for them. Identify the relative proportions of students giving particular responses, and notice patterns that surface in the results. How representative are the responses that stand out? If you have taught the course before, you can compare the results to past semesters and consider whether responses have changed over time.

When you've compared your responses to your students' and analyzed the general patterns in the data, consider how your approach in class has affected your students' responses. Some specific questions or responses may stand out as requiring further interpretation. If, for example, students indicate that they feel very "encouraged to participate in class discussions," try to think of what you are doing in the class that encourages them. Similarly, if students respond that they have difficulty taking notes, reflect on

what you do to facilitate note-taking. Do you write complete problems on the board in the form you want your students to use, or do you skip steps? Do your overheads reflect the organization of the class period? Do you point out key concepts? Reflecting on how class activities are represented in the results will help you decide how to respond to the feedback your students have provided.

Finally, while analyzing the data, consider what additional feedback you would like to get from your students. If you used a machine-scanned form, you might follow it up with a focused, open-ended question to help you determine the meaning behind an unexpected or incongruous answer. Reflecting on the data you have gathered can also help you to revise your questionnaire for the next semester, rewording or adding questions so that the feedback activity can become more effective as time goes on.

Responding to Feedback

After collecting and analyzing the feedback in detail, most instructors find it useful to reflect somewhat more generally on their data. Consider the new insights you have gained about your teaching through this feedback activity. Identify things that are going well in the class and general areas that could be improved. Although sometimes responding to data means simply following student suggestions (e.g., leaving your overheads up longer), it usually requires more thought. For example, if a majority of students complain about the textbook, eliminating it is probably not the best option. But perhaps you could find ways to incorporate the text into the class more effectively. If change is warranted, choose one or two specific changes that will address needs that have become apparent through your analysis of the feedback. Don't try to change too much all at once.

Whether or not you decide to make changes, students need to know that you have carefully considered the feedback they offered, so share your response with them in the way that is most appropriate for your situation. Often, teachers discuss the responses that surprised them or concerned them most and explain how they intend to address these responses in the class. For example, if your students surprised you by identifying a small group activity as one of the most positive experiences of the course so far, you might respond by incorporating such activities on a regular basis. Or, if the feedback has suggested dissatisfaction with the exam format but you feel that change is not an option, you might explain your reasons for not changing and suggest more effective ways for students to prepare themselves for exams. Responding does not necessarily mean setting aside a period to discuss the results of the survey in minute detail. Some teachers feel more comfortable pointing out the changes they've made as they come up in class. For example, if students asked for more feedback on their written work, the next time you return homework assignments you might mention that you are providing more written comments in response to their suggestions.

Keep in mind, however, that not responding to the feedback is worse than collecting none at all. Students expect you to respond and may become apathetic or resentful if they feel their comments are being ignored. This doesn't mean that instructors have to give up control of their courses, changing them constantly at the demand of their students. How much you decide to change in response to feedback is up to you, as is how you discuss the responses to the questionnaire. The real value of midsemester feedback is that it opens a dialogue about the processes of learning and teaching. This dialogue allows you to decide systematically where to make certain changes, when they seem warranted to make the course and the instruction more effective. Making informed decisions about what to change and what not to change—and explaining your reasons to students—is a big step toward becoming a better teacher.

While most instructors see the obvious benefits of collecting and analyzing feedback from students to improve teaching and learning, many nevertheless fail to do so on a regular basis. The reasons are multiple and include such things as the following: not part of the department's academic culture, consistently high end-of-semester student ratings, force of habit, and lack of time. Those who work in an environment where the rewards for good research are higher than the rewards for good teaching simply feel that they have no choice but to put the bulk of their energies into their research. This is understandable, but much of the current literature in higher education is slowly breaking down the barrier that has often separated research and teaching. Similarly, most academics, upon reflection, find that their teaching and research are more closely connected than either they or their disciplines and institutions acknowledge. In the following reading, R. Neill Johnson reflects on his first experience with the concept of classroom research, the systematic assessment and evaluation of classroom processes as they are informed by the culture and research practices endemic to particular disciplines. Like many Penn State teachers, he has discovered that a frequent and systematic examination of what happens in the classroom is one way of studying the epistemological and ontological biases of one's own discipline. Stepping into the undergraduate classroom, in particular, means trying to communicate with people whose assumptions are quite different from yours—people who speak a slightly different language from you and who have a healthy skepticism that you can help them develop, if you dare.

Like Magic!
Classroom + Research = Classroom Research

R. NEILL JOHNSON

Programs Coordinator, Center for Excellence in Learning and Teaching

In the summer of 1994, I was slated to sit in on the Penn State Course in College Teaching as part of my orientation to CELT, which had recently hired me as a teaching assistant. I remember being thoroughly discouraged by one of the course readings for the first session, an article by Patricia Cross called "In Search of Zippers" (*AAHE Bulletin,* vol. 40, June 1988). The article seemed to do little more than generate a monumental list of problems facing higher education, a list that included such seemingly insurmountable obstacles as teaching that does not result in learning, assessment that has no impact on teaching, and research that has absolutely no connection to what goes on in the classroom. For me, Cross's rather cute comparison of these problems to gaps caused by buttons on clothes that don't quite fit seemed completely out of place, nor did the revolutionary zippers that would close these gaps and make buttons obsolete ever seem to materialize. However, in a subsequent semester when I was leading the course and looking at the Cross article with the kind of scrutiny that teaching a text engenders, it suddenly hit me that Cross was offering only one solution to all the problems she described, and that that solution was called "classroom research."

How I could have missed this vital piece of information on the first read, I don't know. I think I may simply have been incapable of associating the two words "classroom" and "research." "Classroom" is a very ordinary word, even homely. To dress it up and make people take notice, you've got to add an adjective like "technology" or "computer" or "CQI." Even words like "lab," "studio," and "lecture hall" sound respectable by comparison. "Research," on the other hand, is rather a grand word in these parts. It's that thing we most associate with success. It has the shine of brass, the weight of lead, and the smell of crisp new Treasury notes. Yes, "research" is the ticket. So to bring "classroom" and "research" together in one phrase and give it a meaning different from the sum of its parts required for me nothing short of a cognitive realignment whereby a new circuit in the brain bypasses the old definitions and creates something completely other. In short, I had one of those "Ah-ha!" experiences whereby the strange seems suddenly familiar.

Classroom research isn't the act of asking students to fill out an evaluation form at the end of the semester and hoping no one ever calls you to say your numbers are in need of elevation. Nor is classroom research a specialized methodology practiced only by people with D.Ed. degrees. Rather, classroom research is the teacher's systematic application of her own investigative skills in the learning environment for the express purpose of documenting what and how students are learning, especially as these relate to her goals in the context of her discipline. This means that the classroom researcher has some control over methods and a vested interest in completing the bulk of the study well before the semester ends. The sooner you collect and analyze student feedback, the better chance you have of helping students learn how their knowing and being are like or unlike your own, and how typical you are of others in your discipline. That old student complaint that infuriated me when I first started teaching, "I gotta figure out what he wants!" makes more sense the longer I teach. This is, indeed, a crucial part of the learning process, not only for the student but also for the instructor. I, too, "gotta figure out what THEY want!"

What has happened to you by the final class session is probably of no interest at all to your departed researchers, but what has happened to them as your research subjects should be of vital interest to you. After all, you'll

probably teach the course again, and you may even be in a position to design curricula within and beyond your own department. So research conducted in the classroom for the immediate benefit of your students may eventually become departmental research, even research of interest to those in your discipline at other universities. Cross's rather daring, futuristic hypothesis is that some day you may even be rewarded for doing such research. Meanwhile, it's better than awaiting the dreaded phone call and avoiding department heads and deans in the immediate weeks after the semester has ended.

Each group of students presents a different set of challenges, and even those of us who have taught a course many times and generally know what to expect from students continue to learn new things and modify what we do accordingly. Over time, we also ask students to do different things. If we don't make needed changes, someone will eventually make them for us, and that "someone" could just as easily be a legislator as an academic. Change is inevitable. What classroom research adds is a rationale and incentive for doing what we alone as teachers are best qualified to do: assess our own students and our own instruction in the context of our own disciplines. The assessments of interested colleagues and administrators, both within and from outside our disciplines, can be very useful. However, there is no substitute for research conducted by teachers in their own classrooms.

VI. Teaching to Learn

This book opened with a definition of "good teaching." The interplay of multiple voices and examples throughout has revealed how subtle this definition can be. The activities that we know as contributing to good teaching are infinitely varied—and yet oddly similar. While styles and personalities may differ, at its heart good teaching engages in the same types of actions one associates with scholarship: it is systematic, reflective, thorough, and analytic. It is thus no surprise that in the landmark work *Scholarship Reconsidered*, Ernest Boyer proposes a "more inclusive view of what it means to be a scholar," a view that defines teaching, research, and service all as categories of scholarship.[54]

Where the model of teaching *versus* research creates tension in one's professional development, Boyer offers an integrated model that allows you to bring to the act of teaching the scholarly skills you use in research. A prerequisite of defining teaching as a scholarly activity, however, is that it must be able to be evaluated—and evaluated in a way that appropriately reflects the complexity of the activity. Just as evaluation in research is part of a public dialogue, including serious peer review, and an ongoing scholarly pursuit, so must it be for teaching. Teaching as scholarship requires that the teacher engage in a continuous process of self-reflection, evaluation, and improvement. Thus, in this chapter, we begin by looking at some of the possible sources and types of data that might be used to foster those processes and ultimately to substantiate the claims we would want to make about our teaching. Then, after offering some very general guidelines for thinking about, assembling, and reflecting on those data, we conclude with some comments about the critical role that self-reflection plays not only in documenting one's teaching but also in the process of becoming a better teacher.

[54] Ernest L. Boyer, *Scholarship Reconsidered: Priorities of the Professoriate*, (Princeton: The Carnegie Foundation for the Advancement of Teaching, 1990), 24.

Gathering Data

How we choose to measure something largely determines what we find. To attempt to assess teaching by a single measure clearly assumes far too little of teaching and not nearly enough of assessment. Because "good teaching" is the product of many variables, how we assess and evaluate good teaching needs to acknowledge that complexity. Ultimately, teaching is best measured when data are gathered from a variety of sources, including students, peers, and oneself.

The sources for measurement are varied because different people can provide different kinds of information about teaching. For example, it is probably counterproductive and inappropriate to ask students about the breadth and completeness of an instructor's content knowledge since, from their point of view, such expertise should be a given. The more obvious and appropriate judges of this information would be department colleagues. Likewise, colleagues are usually not good judges of whether an instructor is prepared for class, arrives on time, or is available for office hours. And neither colleagues nor students are the best source of information for analyzing how one teacher's classes have changed over time. Rather, these data are best collected by the teacher, through consistent documentation of teaching. Clearly getting the right kinds of input from each group of individuals is what will give the evaluation process strength and depth. The picture that emerges from these multiple sources of data provides a far more accurate image than any single measurement can. Accordingly, in the sections below, we elaborate more fully on the strengths of the different types of data as an aid to documenting, assessing, and improving your own skill in teaching.

Student Data

As the immediate beneficiaries of teaching, students are in an ideal position to report and comment on a number of variables, such as which instructional strategies helped them learn the most, whether the instructor provided useful feedback on assignments, and how much the course challenged them. Despite this fact, however, one frequently hears comments such as "students are in no position to judge the quality of the teaching they receive." As Peter Seldin has recently argued, assuming that students are irrelevant to the process of assessing teaching is analogous to assuming that those who eat the dinner are irrelevant to judgment of how it tastes.[55]

The myth that students can't be trusted to evaluate teaching arises out of a concern that student evaluations reflect not the quality of teaching, but other variables, such as the teacher's ability to entertain or the time of day of the class. Fortunately, there is a large body of research on issues of evaluation that helps separate myth from fact. For example, many teachers worry that being a tough grader will negatively affect evaluations. In fact, grade inflation is sometimes blamed on the teacher's desire to be popular

[55] Peter Seldin, "Point of View: The Use and Abuse of Student Ratings of Professors," *The Chronicle of Higher Education* (July 21, 1993): A40.

with students and hence receive higher evaluations. Studies have shown, however, that the correlation between grades and evaluations is not so simple. The key factor seems to be not how high the grades are, but whether or not they are perceived as fair and expected. Similarly, while many believe that more "entertaining" teachers receive higher evaluations, research suggest that the critical factor is that a teacher's expressiveness can help students learn. Expressiveness without substance will not earn high marks, but the use of examples, demonstrations, and stressing important points will help students learn. And, in fact, a recent study at Penn State has revealed that the most powerful predictor of students' overall evaluations of a course was the amount they believed they had learned in the course.[56]

While student evaluations make up only part of the overall picture of a teacher's effectiveness, they can be very useful. As was discussed in the previous chapter, gathering feedback throughout the semester can both help the teacher improve the course and motivate students to learn. Such midsemester feedback activities can also be used to evaluate teaching, along with other sources of student data such as letters from students, interviews with alumni, pre- and post-course examples of students' work, and records of students who select and succeed in advanced courses in the field.

Of course, when discussing student evaluations, the first thing that comes to mind is the Student Ratings of Teaching Effectiveness (SRTE). This end-of-semester evaluation is in some ways very different from the kinds of midsemester feedback discussed in chapter 5. Obviously, the SRTE feedback comes too late to affect the current semester, and while it provides a good overview of effectiveness, it lacks detailed suggestions for how to improve teaching. And unlike midsemesters, the data are reviewed by others. However, they are student data, and thus can be used and analyzed in some of the same ways. For example, while it may be too late to make any changes this semester, one certainly can use the data in preparing for the next version of the course. The questions in the "analyzing feedback" section of chapter 5 can thus help one use the evaluation to improve teaching. The same steps of looking for patterns, interpreting responses, and planning changes still apply.

Because they are also an administrative activity, SRTEs invite some additional questions that help to contextualize the data. As with the midsemester, when analyzing the SRTEs you may find it useful to tally responses and discover, for example, that you are consistently higher on questions of rapport and interaction, and less strong on those that deal with organization. In making sense of the SRTEs, though, this reflection may go beyond just thinking about patterns in one class. You may also find it useful to compare patterns between classes. Do you consistently get higher marks in small upper-division classes than large introductory classes? Is there a pattern in your scores over time? Is there a steady upward trend, or is

[56] Fern K. Willits, Betty L. Moore and Diane M. Enerson, *Penn State—Quality of Instruction: Surveys of Students and Teachers at University Park* (University Park: Center for Excellence in Learning and Teaching, 1997). CELT can provide articles documenting and analyzing the research on student evaluations.

there a one-semester dip that breaks the pattern? What may have caused that anomaly? These questions go beyond helping you change only one section of a course, and help you document and analyze your development as a teacher on a broader scale.[57]

Peer Review

Student data are valuable, but students are not equipped to assess every aspect of teaching. Colleagues within the department are better suited to make judgments about things like the selection of course content, willingness to work with others on instructional issues, and the suitability of courses objectives both in terms of student and departmental needs. Thus peer review is an essential part of the evaluation of teaching.

Furthermore, peer review not only provides feedback to individual teachers, but it also encourages communication and collaboration. As Don Thompson (Food Science) describes below, what we do in each of our own classrooms is part of a larger picture. Seen from his perspective as a department head, teaching is not a solitary activity but a team effort.

Team Teaching a Curriculum

DON THOMPSON

Associate Professor and Head, Department of Food Science

Team teaching is generally thought of in the context of a course with more than one instructor. Some team teaching involves all members of the team at all class sessions; at the other extreme, some team teaching involves assigning responsibility to a team member for the various portions of a course. Neither method is necessarily more team oriented, because the essence of team teaching is working effectively together. The simple presence of the team does not guarantee teamwork, and the lack of the full team at a class session does not imply a lack of teamwork. In both cases, most of the teamwork will be accomplished outside of class. Just as an athletic team spends more time preparing than competing, so a successful teaching team will spend much energy preparing for the actual teaching.

Most courses fit into some aspect of a curriculum. Required courses in a major program are the main component of the curriculum. Prerequisite courses outside the major program are also integral to the program curriculum. Although supporting courses relate to the required coursework less directly, they are also part of the program curriculum.

An important part of teaching is to understand the relationship of the course being taught to the courses previously taken and those to be taken. Teachers of required courses in the major program should be cognizant of the course prerequisites, both outside and within the major program. They should also be cognizant of the courses for which their course is prerequisite. For this awareness to exist, an effective network of interaction among instructors is needed. In other words, an integrated curriculum must be team taught.

Any course should be flexible enough to encompass changes in teaching style and content. In fact, many teachers exercise impressive scholarship in this respect. Some would claim that the concept of academic freedom

[57] For more information about interpreting and analyzing SRTEs, see the CELT publication, "Guide to Analyzing the SRTE."

> ensures that they have the opportunity to organize and conceptualize the teaching in their own classrooms, that the teacher is independent of external influence. What is not always considered is that no teaching occurs in a vacuum at the University, and changes in a course may affect other courses. An intimate and appropriate relationship among courses is important *by definition* for required courses in the major program. This portion of the curriculum in particular is the purview of the program faculty, the collective group of faculty members to which each individual member has a responsibility.
>
> Just as a course can be team taught by more than one faculty member, and the effectiveness of the course may be a function of the effectiveness of the team, so a curriculum is taught by more than one faculty member, and the effectiveness of the curriculum may be a function of the effectiveness of the program faculty working together. In both cases, good communication and interaction is necessary for a coordinated, coherent student experience. In the case of the curriculum, effective communication and interaction among faculty members may be the primary basis for developing and maintaining a vibrant scholarly community of teachers.

When we see ourselves as a "scholarly community of teachers," peer review becomes a logical and necessary activity for providing feedback, supporting evaluation, and building community. Historically, the term "peer review" of teaching has been limited to those occasions when one colleague visits another colleague's classroom for the purpose of making evaluative judgments about his or her teaching skills. However, when classroom visits are used as the sole basis for peer review a number of fairly significant difficulties can arise. First, peer reviewers often attempt to answer questions via a classroom visit that might be more directly addressed by other kinds of review activities, such as critiquing a syllabus and course materials. Likewise, these classroom visits often lack clear standards or guidelines, and frequently occur without a prior consultation between the observer and the teacher being observed. Poorly planned observations also tend to place disproportionate emphasis on what the teacher is doing rather than on what the student has learned, which ignores the "learning" side of the teaching/learning equation. And finally, because effective teaching is far more than a momentary performance in the classroom, strictly limiting peer review to classroom observations trivializes not only teaching—and the many hours of preparations and planning that go into it—but also the very real contribution that peers can make in fostering excellence in teaching and learning.

There is thus a growing movement toward a fuller definition of peer review consisting of a variety of activities that may include but not be limited to classroom visits. Underlying these activities is an emphasis on collegial dialogue about teaching and its evaluation. Judgments about which peer review activities should be used in a particular instance can most appropriately be determined from the purposes of that review. That is, as with all other aspects of evaluation, the most effective and productive uses of peer review will occur only when faculty (and units—e.g., department, college, program) have given thoughtful consideration to the purposes of that review. There are a number of possible peer review activities, two of which are the review of course materials and the classroom observation.[58]

[58] You will find more activities and guidelines for peer review in the "Practical Guide to Peer Review for Departments," as well as several other resources, available from CELT.

The *review of course materials and syllabi* is an especially useful method of peer review because it can be done anonymously, is a good use of faculty expertise, can be done simultaneously by more than one individual, and can be done in a reasonable amount of time. In addition to syllabi, colleagues can evaluate any number of course materials, including handouts, assignments, graded exams and papers, textbooks, and course World Wide Web sites.

Some of the questions that can most readily be addressed by peer review of course materials and syllabi are the following: What are the primary objectives of this course? What kinds of activities are being used to achieve these objectives? How well does the course appear to work as a whole? Is the presentation it gives of the field accurate and reasonable? Does the course appear to reflect appropriately high standards that are consistent with overall departmental standards? How well do the course objectives fit within the program of study it is part of? Is material sequenced in a manner that will help students gain greater mastery of the subject, excite them about subject, and help them develop critical thinking skills? Are tests and assignments appropriate to the course goals and the students who take it?

Although too often limited to one or two visits per semester, *classroom observations* by a colleague can be a valuable source of information both for developmental and evaluation purposes. It is generally recommended that the observation be preceded by a consultation with the faculty member being observed so that the reviewer has a clear sense of the course goals and the instructional methods that will be used. One of the greatest dangers and misuses of classroom visits by peers occurs when the observer is uninformed about the objectives of the course or class session. Because the observable indicators of an effective discussion, or successful small group activity will—and should—look quite different from the observable indicators for an effective lecture, it is critical that there be some communication prior to the classroom visit.

Typical questions that can be most appropriately addressed via classroom observation are those that concern the design of a course and presentation of the material, command of the subject matter, and level of enthusiasm displayed by both the students and the faculty member. In addition, a classroom observation is an appropriate occasion to address questions such as, What kind of classroom atmosphere does the instructor create? In what ways are students encouraged to ask questions? Did the session appear to go as planned?[59]

Data from Oneself

Self-analysis and self-reflection are too often overlooked in the assessment of teaching and learning, yet they are central not only to assessing teaching, but also improving it. Throughout this book, we have encouraged self-reflection, whether it be reflecting on your goals and objectives, analyzing feedback, or

[59] The "Guide to Classroom Observation" is printed in appendix D.

reviewing changes and development. Conscious reflection on teaching is often occasioned by events such as departmental teaching reviews, teaching award nominations, workshops, and conferences, yet its more easily reflect development than those from other sources. Self-reports should also be compared with data from other sources. Because feedback that provides new information is most likely to produce change, it is by virtue of such comparisons that personal growth and improvement occurs.

Creating a Teaching Portfolio

Collecting data is obviously only the first step of any assessment. The evaluation of teaching is not just the accumulation of evidence but, even more important, the analysis, synthesis, and sharing of that evidence. One way to pull together these multiple measures is the teaching portfolio.

There are a number of different ways of thinking about teaching portfolios. The term itself is used in various ways. We're using it in the most generic: a collection of artifacts and documents that provides substance to claims about teaching. The format and content of a portfolio may vary considerably depending on a number of factors, including the purpose(s) it will serve. A portfolio that is part of a job application package, for example, will look very different than one submitted for a teaching award. But in most cases, a portfolio is likely to contain a short reflective narrative followed by an appendix of supporting documentation. The American Association of Higher Education outlines the following guidelines:

> At the heart of the portfolio as we envision it are *samples of teaching performance:* not just what teachers say about their practice but artifacts and examples of what they actually do. We argue, too, that portfolios should be *reflective:* work samples would be accompanied by faculty commentary and explanation that reveal not only what was done but why, the thinking behind the teaching. Finally, we argue for portfolios that are structured and selective: not . . . "pack-ratting run rampant," but a careful selection of evidence organized around agreed-upon categories, which themselves represent key dimensions of the scholarship of teaching.[60]

Most sources recommend that you maintain a file of materials and data that you have collected from students, peers, and yourself. From these, you can select materials to be included as circumstances dictate.[61]

Most important, however, is your analysis and synthesis of these materials. The teaching portfolio provides rich opportunities for improvement through critical self-reflection of the very processes—teaching and learning—we are assessing. In most cases, your *teaching philosophy* will narrate and provide a guide to your portfolio. As is evident from the examples in appendix E, a teaching philosophy is a highly personal and individual document, representing your basic beliefs about teaching and how you act upon

[60] Russell Edgerton, Patricia Hutchings, and Kathleen Quinlan, *The Teaching Portfolio: Capturing the Scholarship of Teaching* (Washington, D.C.: American Association for Higher Education, 1991; reprint, 1993), 4.

[61] CELT houses a number of resources on creating teaching portfolios, including Peter Seldin's *Successful Use of Teaching Portfolios* (Bolton, MA: Anker, 1993) and publications of the American Association for Higher Education.

them. Because it forces you to articulate your beliefs, examine the artifacts of your teaching, and reflect on your actions, the process of creating a teaching portfolio can be beneficial whether or not it is ever seen by another person. Those who have done so report that the process itself is a learning experience.

As Pat Hutchings observes, however, the process is beneficial not only to the individual, but also to the community.[62] On the other end, departments and colleges have found that the processes of defining and reviewing portfolios have made teaching more public. Faculty must get together to clarify their criteria of excellence, to discuss what is going on in classrooms, and to share their experience. Teaching portfolios are thus part of the larger trend to "open the classroom door."[63] As we reported in the introduction to this book, this is a growing trend at Penn State, too. Many units here have begun to have these kinds of discussions, and the use of teaching portfolios can help build a community of teachers.

Striving for Excellence

The previous sections of this book were intended to guide you as you begin to teach. However, good teaching is an ongoing process of self-evaluation and improvement. Even an award-winning teacher like Helen Manfull (Theatre) says, "I'm still always groping, struggling." This kind of striving to improve is a theme in all the essays in this book. Good teachers constantly seek new ideas through observing others and by evaluating themselves.

In the last essay, Marie Secor discusses the necessity of self-reflection in teaching. She describes how teachers, like musicians, can achieve what appears to be spontaneous, natural brilliance only through conscious reflection and the mastery of technical skill. Her analogy is a fitting conclusion to this book. The hope here is that the readings will provide inspiration and support in your own struggle for excellence.

Teaching and Self-Reflection[64]

MARIE SECOR

Associate Professor, Department of English
Graduate Teaching Award, 1996
Alumni Teaching Fellow, 1990

I come to the subject of self-reflection from the perspective of someone who teaches rhetoric and literature to small classes, which means I profess the productive art of writing and the interpretive art of reading. After many years of experience, I am still convinced that both of these arts can be learned and both can be taught. I am also sure that we can say whether they are performed more or less expertly in any given instance. So I haven't given up on the whole enterprise yet.

[62] Patricia Hutchings, "Introduction," *Campus Use of the Teaching Portfolio: Twenty-Five Profiles*, ed. Erin Anderson (Washington, D.C.: American Association for Higher Education, 1993), 3.

[63] Patricia Hutchings, "Introduction," 4.

[64] Originally given as an IDP Master Teacher Seminar on April 8, 1992.

Furthermore, I begin with the assumption that students are in my classroom to learn. I assume that they are there to learn how to confront issues raised either by literary texts or by public discourse and to analyze these issues through increasingly sophisticated perspectives. As a result, then, I see my role as teacher as that of discussion leader, not entertainer or information giver. And, perhaps most importantly, I am reminded by my own discipline that as teachers we are perforce rhetoricians who are engaged in finding the available means of persuasion for the subject at hand and in considering audience and purpose in all that we try to teach. That's Aristotle's affirmation. As part of our job in the classroom, we need to take account of our audience by adapting our ideas to people and, ultimately, by adapting the people we teach to the ideas we profess. Teaching, then, is an interactive process, one that occurs in the confrontation of the students who inhabit our classes, the material at hand, and our own understanding of it. Command of the material is indispensable, but what we really convey to our students is the material plus our own relationship to it. This is why I believe that teaching is a rhetorical art, and as such it must have a reflective component whereby we negotiate between the subject matter we profess, our own consciousness, and the audience before us.

However, I don't think reflection comes naturally. In fact, I can speak about this subject—self-reflection and teaching—from the experience of somebody who came to it fairly late. I have not been a self-reflective teacher throughout my whole life. If asked at some earlier point in my career, my first impulse would have been to say that asking teachers how they teach is like asking caterpillars how they walk—thinking about it too much could cause them to trip over their own feet. Over the years, however, I have had second thoughts about the effects of self-reflection. After all, any improvement in any skill we perform is made because we become aware and gain conscious control over what has been either automatic or unconscious. You cannot, in any consistent way, achieve what you don't strive to do. As teachers, we know that it is important to tell students what they are doing right—as well as what they are doing wrong—so they can learn to do the right things more consistently and with more control over the process and the outcome. In the same way, we ourselves also refine and improve on what comes naturally in teaching by means of reflection.

The point, then, is not that practice alone makes perfect. We do not get better just by doing more of what we do. Rather, practice makes permanent. If we want to get better at anything we need to practice it and acquire control over the action. It's a lot like learning to play the piano: first you have to learn how to play the notes correctly, and then you have to practice diligently. Eventually it all sounds easy—as if you haven't been practicing at all.

Now I would like to chart some of the incidents that have precipitated my own reflections about teaching. Sometimes self-reflection is prompted by the discovery of something surprising about ourselves. Some years ago, for example, a colleague of mine who was working on a writing-across-the-curriculum project sat in on a literature course that I was teaching. She came every period, took notes, even participated in discussions, taped sessions, interviewed students, examined papers, and made an analyzed transcript of interviews and classes. Until I got used to her presence, it was frightening. Her very presence made me nervous; I felt accountable, judged. I was amazed, however, when she pointed out at the end of the semester that my class discussions had a consistent shape. I tended to begin conversations about the literature with very general questions, asking for responses to the reading assignment of that day, and then I would hone in on more specific questions and problems as the hour progressed. Like the character in Molière who was surprised and delighted to find out that he had been speaking prose all his life, I was thrilled to find that I did anything shaped and systematic in leading discussion. I was even more pleased to discover that this knowledge helped me to increase my control over the discussion process. As I have continued to teach literature courses, I have worked to refine my technique of encouraging broad responses from the class at the beginning and then probing for more difficult or subtle points of interpretation. Through this experience I also learned a great deal about integrating writing assignments into my courses. I discovered that the more I articulated my own expectations about the assignment and the more I modeled what I wanted students to do with the papers, the better the results were.

Self-reflection can also come about when we find ourselves guilty of things we would certainly deny if confronted directly. About ten years ago, before the topic became a hot issue, I attended a lecture by Bernice Sandler on

classroom climate for women. Like everybody else, I had always considered myself exemplary and nonsexist, indeed quite respectably feminist. However, she presented evidence on how men get called on in class first and more frequently and are responded to more positively by both men and women teachers. She accused no one, but like most members of the audience I felt the need to test her conclusions in my own classes. Consequently, I became much more conscious about whom I called on, how often, and in what order, and about the indirect messages conveyed by my responses to students' comments. If I had been forced to face these issues directly, I probably would have resisted awareness of them. I think I would have just said, "Not me, I'm perfect." But as an anonymous member of the audience at a lecture, I had no need to be defensive and consequently was able to change. The point is that we all change over time, although if confronted we tell people that we have always been perfect.

Another incident that caused me to reflect on my teaching occurred a few years ago when I attended a talk by Professor Erika Lindemann at the Penn State Conference on Rhetoric and Composition. She had observed and coded teaching evaluation reports for the hundred or so teaching assistants she supervised. From these observations, she arrived at some general conclusions about how classes naturally fall into segments. For example, she noticed that classes typically begin with review, setting the context for the day's work and summarizing what went on the previous period. She also observed that teachers tend to use certain cues to signal the end of one of these phases and the beginning of another. One such cue, she noted, is the question, "Are there any questions?" Although it looks like a request or an opening for discussion, she noticed that it actually indicated readiness to shift to another topic, to close one segment and move to another. She thus explained why you shouldn't be surprised when you get very few responses to such a question because it's not a question but a transition. If you really want to know whether students are comprehending the material, you need to ask more probing and direct questions.

Her talk led me to think about the function of different kinds of questions in the classroom. It was not something I had thought about analytically before. Upon reflection, it became clear that some questions are rhetorical, implying their own answers; some structure the teacher's own responses; some are designed to check up on whether students have done their assignments; some are formal, seeking specific information that the professor already knows; and others are meant to prompt students to wrestle with real problems. Again, this is not a terribly difficult point to grasp, but it's not one I had previously thought about a great deal, and it does have practical implications.

In order to get the kind of responses that you want, you have to pay attention to the kinds of questions you're asking. I often hear people comment on how well a class went because "so many students spoke." But the fact that they spoke does not mean that they have participated. We need to reflect about what we mean by class participation and what we expect it to accomplish. If your questions request information, that is what you get; you are simply finding out if the students did the reading. You can do that, but that is not discussion. Discussion is something else. If its purpose is to promote understanding and analytic skills, then we need to know the kinds of questions to ask in order to get the kinds of answers we want. Listening to the observations of an experienced teacher who had watched hundreds of people teach thus led me to reflect on the function of questions and segments of class and how you get from one to another.

These incidents, and others like them, though relatively minor, have all prompted me to reflect more on what I do when I teach. They also have raised some fundamental questions about teaching in general. For instance, is there any reason to keep our aims in the classroom secret from our students? In writing, we often forecast for our readers the structure of the argument. We also teach students to do the same in their papers so that they not only have a clear organization, but also reveal that organization to the reader. The advice we give to our student writers is good advice for teachers as well. Students should not be treated like spectators at a magic show—there to be astonished and fooled at our sleight of hand or mind at the podium. If we let them in on the secret so that they understand the purpose and methods of the whole enterprise, they will generally find it easier to follow what we are doing. So I have started making more foregrounding statements of purpose and more final statements of summary in my classes. If classes fall into segments, students can be told where they've been and where you want them to go. It also helps students shift between levels of abstraction and organize mentally what they are hearing. That's an important part of learning.

Some aspects of self-reflection really come with age and confidence. I am very happy to belong to a profession where gray hair is not a disadvantage. When we start out as teachers, I think we can imitate those we admire, or perhaps, unfortunately, pass on some of the worst clichés and most thoughtless responses. When I was a new teaching assistant, the only advice I ever got about teaching was, "Don't ask a question that has a 'yes' or 'no' answer." I guess it's good advice, but it didn't take me very far. In the long run, the only perspective one can bring to the classroom is one's own, and we can't really fool anyone into thinking it's more than that. We can, however, let students witness the process and effort it has taken for us to reach the conclusions we have come to. I find that my classes are more effective if I allow students to trace with me the hard questions raised by the literature we read or the writing problems we face. For instance, they respond better to Wilkie Collins' novels if they know what kinds of questions they raise for me and how my own understanding of them has changed over the years. I think you have to chart your own reaction to the material as you teach it so students can see the subject matter as related to an active process of intellectual engagement. Modeling this process helps to teach writing. Students write better arguments if they see writing as an opportunity to articulate exactly where issues rub and puzzle for them.

Let me stop for a moment and tell what I hope is an illustrative story. I teach a 400-level course in advanced expository writing—that's a dull title for a very interesting course in argumentation about public issues. I decided one semester to let the students pick the topics for the course by making presentations on what they thought were good argumentative issues and then voting on the five we were going to use for the class. Much to my dismay, the students voted to write about abortion. My initial reaction was, "I cannot handle this." It was one of the last things I ever wanted to deal with in the classroom both because I knew what I thought and because I did not think most people were open to persuasion on the subject or capable of sustained rational discourse. If ever there were an issue where argumentation was not going to work, this was it. However, I figured that even though I had given away the power to determine the subject matter, I had one remaining power as teacher: I couldn't tell the class what they were going to write about, but I would tell them when they were going to do it. I temporized by putting the abortion issue last in the syllabus and by assigning the best essays I could find on both sides of the subject because I knew that the class would have to do a lot of hard thinking about argument and audience before they were ready to tackle this issue. Well, the result was probably the best set of papers I have ever received—on all sides of the issue. Because we had reflected on it and because we had seen the differences and faced them directly, we were all able to handle the issue in a much more controlled and self-conscious way.

Of course, students also can be the agents and the creators of the best kind of reflection. I can tell another story about a student who came to my office last week. I had set up appointments to meet with all my freshmen about their writing assignments, and I had asked each of them to come in with their papers and a progress report. I had a nice, neat little format planned: I would tell them about the preceding paper, talk about the one I had just handed back to them, and then ask them about the ones they were going to write. My student came in, and we went through my well-planned routine, but when it came time to leave, he didn't rise from his chair. So I asked, "What's the matter?" He said he had been collecting quotes about the teaching of writing from my lectures all semester, and he wanted to read them back to me. Flattered, of course, I was curious to know what accidental wisdom I had imparted. He turned his notebook over, and from the back side of the cover he read me a number of sentences that I recognized, at one point or another, as my own.

I can't recall all of them, but I remember that I had ranted one day about wanting to teach fluency in writing and about how fluency was the product of obsession and technical command. This student, a musician, was struck by the connections between writing skill, as I had defined it, and skill in jazz improvisation. In jazz, he said, you have to have complete technical command of the principles of harmony and theory as well as the ability to make your fingers do what your brain tells them to do with the instrument. And you have to be carrying the music that you're thinking about obsessively in your head. You have to know that music and the problems that it presents very well in order to be able to improvise at all. If you have to worry about your knowledge of chords or your instrumental technique or your knowledge of the piece you are playing, you can't improvise. Well, the same is true in writing. If you can't shape a

sentence or turn a phrase or structure an argument, if you can't make words do what your brain tells them to do, your knowledge of the subject matter won't do you much good. The converse is also true. If you haven't really thought about the issue you are writing about, all the technical ability in the world won't produce anything but empty rhetoric.

Unfortunately, I also have a story to illustrate this last point. The same day this first student came in, I had a terrible experience, and I have to confess it publicly to expiate it. I absolutely lost my temper at a student. I treated him like an angry mother. He was a bright student who had been doing shoddy work, missing conferences, sleeping in class, derailing discussions with irrelevant comments delivered pontifically between snoozes—the kind of stuff anyone who has been teaching long enough knows how to handle. But I just lost it, mainly because the student was proficient enough not to be failing. The work got handed in, and if it didn't rise to brilliance, it was competent—even, at times, clever. On reflection, I think I got so angry because I had just had my nose rubbed in the bad side of rhetoric—empty words, expedient and neatly packaged, technical ability unaccompanied by serious thoughtful engagement in the subject matter. Of course, that's the occupational hazard of rhetoricians. When things go well, we are confident about the universal applicability of our disciplinary perspective, but when our efforts fail, it shakes our confidence in both ourselves and our discipline.

I want to go back because I want to forget about that incident and return to my other student's thoughtful comments about writing and improvisation. They really struck home to me, partly because I carry around a former musician's sensibility. He very cleverly distilled from my class some attitudes about teaching writing that I had not previously thought through or articulated—except when on an accidental riff. His analogy with jazz helps explain for me the processes of both writing and teaching.

As a teacher, I obsess a lot about my successes and failures and keep worrying about how to turn students into better, more thoughtful writers and readers. I am also a parent and obsessive about that too, and all motherly partiality aside, I know that I have raised two very competent and fluent writers. I puzzle over this a lot because my children are ornery and do everything I tell them and my students not to do. They produce no outlines or drafts, they put off writing until time pressures are severe, they revise some but not a great deal—and they usually produce good work on both long and short assignments. I also have to give credit where it's due, and it's not due to me here. What they do is obsess over the task at hand and think about problems of the subject matter. Then they think about the assignment and how to articulate their responses. They walk around preoccupied until, given their high level of verbal facility, they sit at the computer and produce. I would like to be able to teach that skill although I know I can't duplicate the lifetime of compulsive reading and writing that went into it. I can, however, teach students the forms of verbal facility at every level—from word choice through sentence structure to development and argument, and I can try to use the classroom as the place where obsessive thinking about intellectual issues gets launched.

Because I teach both writing and literature, I often feel schizophrenic in a profession of specialists usually devoted to one or the other. But every once in a while the two parts come together and add up to the same message. In my Victorian fiction course, for example, I teach the novels of Anthony Trollope. Here is a writer who destroyed his own reputation by writing an autobiography. In it he tells how for 40 years he kept to an astounding writing regimen, rising before five every morning (his servant brought him coffee), sitting at his desk and producing 2500 words of a novel almost every day of his life, 250 words every 15 minutes (timing it by the watch), even—legend has it—finishing one novel and starting another the same day. The result was 47 very long Victorian novels, plus an outpouring of stories, essays, travel books, and biographies. More impressive, at the end of every day's writing stint, he would go to the post office at 9 a.m. to put in a full day's administrative work there, writing letters, filing reports, and generally straightening out the British postal system. Penn State would love Trollope's work ethic. People immediately assumed from his account that Trollope was merely a hack and no artist since he never relied on inspiration and kept careful accounts of both his time and the money he earned by his pen. But if you read the autobiography carefully, it becomes apparent that Trollope was no hack at all but a genius. In fact, you see that he was able to maintain this level of productivity precisely

because he obsessed and carried stories around in his head all day and was totally preoccupied with them. He was involved every waking moment with what the people he imagined were likely to say or do in every circumstance he could imagine. He called it "castle building" or day dreaming or living with his characters to an appalling degree. He berated himself—and was berated for it—throughout his life. The point is that you can't write fluently unless the mental work is going on all the time. I can't think of any reason to be at a university or to be a university teacher except to create and foster the condition under which that kind of obsessive reflective activity can take place.

I started out thinking that teaching oscillates between spontaneity and self-consciousness. But that's not right. Real spontaneity, enthusiasm, and energy in the classroom are not at all opposed to conscious reflection. Again, it's like playing the piano. The music sounds energetic and spirited and spontaneous only after enough practicing and self-reflection have occurred. In music, it is like the beautiful, free rubato of Chopin, released within the bounds of strict form and tonality. We need to become self-reflective teachers because anything that can be done well requires both technical facility and complete command of the subject matter. Reflection about teaching is really the indispensable condition of both.

Appendix A: Managing the Classroom and Relating to Students

Sometimes teachers are called on to make decisions beyond what to teach and how best to teach it, whether that means dealing with a student who disrupts class or suggesting a course of action for a student who is having personal problems. No matter how experienced or well-prepared a teacher is, managing a classroom and relating to students requires sensitivity and insight. In this appendix, we will discuss guidelines for handling some of the unexpected problems that can arise in the classroom or with individual students.

Many beginning teachers raise questions about how to handle the dynamics of the classroom: *What do I do if a student causes a disruption? How can I keep from losing control of the class?* They wonder what techniques they can use to guarantee a well-controlled classroom. But classroom management means more than just maintaining strict and rigid control over the class and its content—it means establishing a comfortable environment that allows everyone to learn and participate freely. You can avoid many problems by making your expectations for the class clear through what you say and do from the first day of class forward. Explaining your policies at the outset and following them as the semester progresses provides a common set of ground rules for you and your students. As the following list of tips suggests, prevention is often the key to avoiding difficult situations in the classroom.

Tips for Managing the Classroom Environment

1. Start class on time, sending a message that being there is important. If a student arrives late several days in a row, say something before it becomes an irreversible habit.
2. End class on time. If you begin letting students out early, they will begin routinely packing up their backpacks before class is over; if you go over time on a regular basis your students will become resentful.
3. Announce your office hours and keep them faithfully. Being accessible can prevent many problems.
4. Deal with disruptive students individually, outside of class, not during class where your credibility is on the line.
5. Deal with disruptive students in person, not by phone or e-mail.
6. When talking with a disruptive student, focus on how his or her behavior affects you and the other students.
7. When asked a challenging question, don’t bluff. Students, even very good ones, quickly lose respect for teachers who give just any answer to a tough question.

8. Set policies at the beginning of the course. In particular, make sure attendance and grading policies are clear, preferably in writing.
9. Adhere to the policies you set—to the rules you spell out in the syllabus and/or in discussions with your students.
10. Do not deal with students when you are emotional.
11. Do not deal with students when they are emotional.
12. Be conscious of signs of racial or sexual harassment, whether by you, towards you, or towards other members of the class. Make it clear by your words and actions that put-downs or derogatory comments about any group for whatever reason are simply not acceptable.
13. Refer students with psychological, emotional, academic, or financial trouble to the appropriate counselors (see the directory of resources in appendix F). You can be sympathetic and supportive, but becoming a student's counselor can cause problems.
14. Know your students' names. If you have a large class, learn as many names as possible. Students are more likely to cause problems if they are anonymous in the classroom. When you use your students' names, you give them a sense of personal responsibility for the class.
15. When acting as a teaching assistant, involve yourself only to the extent that you are expected to be involved. If the professor you are assisting is in charge of determining grades and you receive complaints about grades, have the students deal with the professor. Do not foster a "me against you" attitude, and do not side with the students against the professor.

These tips provide some basic guidelines for maintaining a productive classroom and a respectful relationship with your students. Here are some responses to more specific questions that beginning teachers sometimes ask about classroom dynamics.

HOW SHOULD I HANDLE A DISRUPTIVE STUDENT?—Sometimes, a zealous student who dominates the discussion may not intend to disrupt the class. Perhaps the student just likes to talk and occasionally gets carried away. If the student seems to have good intentions, you may only need to try some of the techniques described in the section on teaching with the discussion method to get the class back on track (see chapter 2).

If a student disrupts class with persistent questions about a grade or some other issue and does not respond to your efforts to refocus the class to the scheduled material, it is best to take the conflict out of the public setting of the classroom. Discussing such matters in an open forum with the rest of the class as an audience can escalate a minor misunderstanding into a major conflict. Instead, offer the dissatisfied student an opportunity to air any grievances during your office hours, then return to the general business of your class. When the student arrives to discuss his or her concerns, listen to all grievances, repeat the main points to make sure you understand them, and show a genuine willingness to compromise when possible. Express your regret when you cannot compromise, but indicate that the student has been heard.

Unfortunately, on rare occasions more difficult problems arise. If you have a seriously disruptive student who seems threatening toward you or members of the class, it is best to consult Judicial Affairs early in the process of dealing with the student. Through working with faculty and departments across the University, the staff of Judicial Affairs has gained experience with effective ways to handle serious classroom problems and will help you determine the most appropriate way to deal with your situation. Their suggestions may include meeting the student with a witness present, consulting with your department head, or having the student removed from your class. Likewise, Judicial Affairs can help if you are experiencing personal harassment (e.g., hang-up telephone calls, stalking).

HOW AVAILABLE SHOULD I BE TO MY STUDENTS OUTSIDE OF CLASS?—As you set your course policies at the start of the semester, you will make decisions about office hours and other questions of out-of-class availability. Most teachers offer a set number of drop-in office hours each week. You might talk to other teachers of the course to find out how many office hours a week are appropriate, or your department may have a policy to guide your choice of office hours. Whether you are working with a departmental policy or not, it's a good idea to space your office hours out in the week and schedule them at different times of the day. Remember that most classes at Penn State meet Monday-Wednesday-Friday or Tuesday-Thursday. This means that if your office hours are scheduled only for Tuesdays and Thursdays at 10:00 a.m., some of your students will never be able to attend them because of a conflicting class schedule. You can reduce the likelihood of this type of conflict by scheduling the hours on different days or at different times, and/or by offering some office hours "by appointment."

When you schedule office hours by appointment, keep track of how much time you spend meeting with students. Sometimes in an effort to be accessible teachers end up overextending themselves. It's important to be available to students when they need to talk about the course, but meetings should be scheduled for times that are mutually convenient. They should also be kept to a reasonable length. Long, drawn out sessions are rarely better than shorter, more focused ones. Rather than going over every problem on an exam with a student, for example, it might be more beneficial to help the student define specific concepts or procedures that caused difficulties, focus on explaining and demonstrating those, and then plan together what the student can do on his or her own to reinforce what you worked on in the session.

Some teachers find that supplementing office hours with e-mail and telephone availability can cut back on special appointments. With e-mail, students can ask questions without coming to your office, and you can respond at your convenience. Most of the questions students ask over e-mail are easy to respond to with a brief message, but if a student asks something that requires a more involved response, or something you feel should be discussed in person, you can suggest an office visit. Likewise, some teachers give students the option of calling them at home if they have a question or need an appointment. If you feel comfortable with this approach, it is a good idea to set some guidelines for hours that you would be available (perhaps 9:00 a.m. to 9:00 p.m.) so that students know when it's too late to call. Again, if a student calls with a question you can best address in person, you can make an appointment to meet.

HOW CAN I HELP STUDENTS WHO ARE STRUGGLING ACADEMICALLY?—Although most teachers encourage students to visit office hours when they have questions about the material, many students wait to come until they are concerned about their performance in the course. In fact, teachers commonly report an increase in office visits after returning the first set of exams or papers. Students can feel threatened and defensive when they get their first grades in a course. Oftentimes, they react as if the grades they receive are indicative of their attributes as a human being, not a measure of how closely what they produced met the grader's expectations. Usually, the best way to deal with this situation is to help students to interpret the experience in a more reasoned manner. In many cases, just talking candidly with students about their expectations for their own performance and about ways to improve their preparation for the next exam will be enough. Looking at their class notes together and discussing their study habits may help you make suggestions for improvement.

In other cases, students may be struggling academically because they need individual attention or a review of prerequisite information. If a student needs more assistance than you are able to provide in office hours, you can help by encouraging the student to make use of one of the many University resources offering academic help. The University Learning Resource Center provides free tutoring services for students through the Writing Center, the Math Center, the Computer Learning Center, and the Tutoring Center. Encourage your students to take advantage of these services, which are listed in fuller detail in the directory in appendix F.

WHAT IF A STUDENT IS HAVING PERSONAL PROBLEMS?—Because you see your students on a regular basis, you may notice when a student is experiencing distress over such pressures as work, school, finances, family, or personal relationships. One sign of such stress overload is a marked change in the behavior you observe in the classroom, such as an increase in missed classes, frequent requests for extensions, unusual class disruptions, and unprecedented anxious behavior. Since a student may come to you to ask for advice or help when feeling overwhelmed by the pressures of school and life, it's a good idea to think about how to deal with such situations before they arise.

If a student approaches you with personal concerns, try to listen carefully and set the student at ease. Many times all that the student really needs is a friendly and more experienced ear. If you are comfortable providing it, fine. Do not feel, however, that you need to provide ongoing counseling for your students. It is probably best that you do not. Let the student know you understand the problem, and encourage him or her to explore the available options for assistance. If the student asks you for advice, be clear about what your limitations are and encourage the student to consult a professional or another appropriate person. If the student resists seeking professional help, describe why and how you think it might make a difference. It might make your student more comfortable if you can refer him or her to an individual person at an on-campus service such as the Center for Counseling and Psychological Services (CAPS).[65] If you are concerned about a student who seems to need help but has not asked for it, it's best to consult with a CAPS counselor to determine the most effective way to proceed.

IS IT EVER ACCEPTABLE TO DATE ONE OF MY STUDENTS?—The answer to this question is a simple and unqualified "No"—not for as long as he or she is your student. The inherent hierarchical dynamics of the relationship between teacher and student preclude many social possibilities. However limited your instructional role may be, it is nonetheless a position of authority, and that authority should not be brought into a personal relationship. Ultimately, the burden of responsibility is with the instructor. If you find yourself in the awkward position of being attracted to or pursued by one of your students, there are a number of possible solutions to the problem. It may, for example, be possible to have the student transferred to a different section. However great the temptation or frustrations, do not act on your feelings. If necessary, discuss your feelings with someone who can help you sort out the issues, such as an adviser or another faculty member.

In light of the complex teaching/learning relationship, it is always best to be circumspect in your treatment of students. Not all undergraduates can easily sort out which gestures are merely friendly and which are sexual. Friendly gestures that may not seem so bad (touching, embracing) can easily be misinterpreted and lead to unnecessary conflict. Be prudent and err on the side of a bit too much formality rather than too much chumminess. You are not the

[65] Contact CAPS for "Students in Distress," a guide designed for faculty and staff who are concerned about how to help a student at risk. CAPS staff members are also available for consultation with teachers who have questions about handling a specific situation. See the directory in appendix F.

students' friend—friends do not give grades or wield discipline. You are their mentor. If you have trouble picturing yourself as an authority who knows all, try picturing yourself as the leader of the expedition as your class explores the subject of the course.

HOW CAN THESE AND OTHER PROBLEMS BEST BE AVOIDED?—Most problems can be avoided by following the guidelines of common sense. Treat every student with respect. Maintain a tactful but businesslike tone and do not frequently deviate from the course topic. Never ridicule a student—any student—whether in your class or not. Do not discuss one student with another. Do not discuss other instructors or faculty with the students. Remember, you are the representative of the institution and your field. Finally, be assured that you are not on your own. When you are in doubt about how to handle a situation, do not hesitate to consult with other teachers in your department, with the various support services available at Penn State, or with the Center for Excellence in Learning and Teaching.

Appendix B: Preparing a Syllabus

The value and utility of a good syllabus should not be underestimated. The time you spend planning the course and writing a syllabus will have far-reaching and time-saving benefits throughout the semester. In chapter 1 we discussed some of the general principles involved in planning a course. This appendix provides additional practical guidance in writing a syllabus, as well as some useful examples. The first item is a checklist for reviewing syllabi that was prepared by participants in the Course in College Teaching. You and a colleague might use the checklist to review each other's syllabi, or you can use it by yourself to reflect on your own syllabus. The list is intended to be comprehensive, but not prescriptive. Some items, such as home phone, are clearly optional. Others, such as lab safety, are relevant only in certain courses. The University Faculty Senate does require that students be provided the following information during the first ten days of class: the examination procedures and grading policy, the academic integrity policy, and the evening exam schedule for daytime courses. Beyond these basic requirements, the merit of any item depends on what information the instructor wants to communicate to the students at the beginning of the semester.

Syllabus Checklist[66]

	YES	*NO*	*N/A*	Not *clear*	*Comments*
Course Information:					
• Course title					
• Course number					
• Credit hours					
• Prerequisites					
• Permission from instructor required?					
• Classroom location					
• Lab/recitation location					

[66] The participants of the Course in College Teaching partly based this checklist on Howard B. Altman and William E. Cashin, "Writing a Syllabus," *IDEA Paper*, no. 27 (September, 1992).

	YES	NO	N/A	Not clear	Comments
• Meeting days					
• Class hours					
• Lab/recitation hours					
• Department location					
• Web page					
Instructor Information:					
• Full name					
• Title					
• Office location					
• Office phone number					
• Office hours					
• E-mail address					
• Department phone number					
• Home phone number					
• Teaching Assistant(s)					
• TA name(s)					
• TA office location(s)					
• TA phone number(s)					
Texts, Readings, Materials:					
• Textbook authors, titles, editions					
• Textbook price(s)					
• Supplementary reading					
• Supplementary reading price(s)					
Course Description/Objectives:					
• Catalog description					
• General course content					
• Instructional methods					
• General course goals					
• Objectives for students					
• Description of major assignments					
Course Calendar/Schedule:					
• Readings					
• Homework					
• Assignments					
• Paper due dates					

	YES	NO	N/A	Not clear	Comments
• Exam dates					
• Quiz dates					
• Required special events					
Course Policies:					
• Attendance					
• Lateness					
• Class participation					
• Missed exams					
• Missed assignments					
• Lab safety/health					
• Academic dishonesty					
• Grading					
• Support services					
• Extra credit					
Other:					
• Disability statement					
• Statement to cover possible changes in syllabus					

This checklist covers most of the basics, but many Penn State teachers have explored additional options and possibilities. For example, Harold Schobert (Materials Science) includes a list of "commonly asked questions about this course," which answers questions such as "How much math do I need for this course?" and "What are the exams like?" Likewise, Kelly Madole (Psychology) provides a page of "advice for successful performance" in the course as part of her syllabus (see below).

Many faculty and TAs now also post their syllabi on the World Wide Web. Not only does this provide easy access for students, but it also allows them to create a syllabus that includes more than a paper syllabus can. For example, John Harwood (English) links from his syllabus to style manuals, assignment sheets, and student projects. Anthony Verstraete's (Management Information Systems) on-line syllabus provides links to University policies, on-line study pages for each exam, and exam keys and answer explanations. Other syllabi allow students to write e-mail to the instructor and link to other useful resources on the World Wide Web. In addition, a Web-based syllabus can be updated more easily and frequently than a paper one, and many teachers add links to homework solutions, exam keys, and student samples as the semester progresses. A syllabus posted on the Web also reaches beyond Penn State, allowing users all over the world to access the objectives, assignments, and other materials for the course. For example, Douglas Arnold's (Mathematics) calculus page has been accessed over 55,000 times and has won national recognition.[67]

[67] These and several other online syllabi can be accessed through links at the CELT Web site (*http://www.psu.edu/celt).*

If you are writing a syllabus for the first time or revising a syllabus you have used previously, you will find it helpful to see what others have done. You can find many examples on-line by browsing the Penn State Web site, and many departments keep copies of old syllabi on file. In addition, we've included the following two examples offered by Penn State teachers. Remember, though, that each syllabus is a unique and individual document. These models may provide some ideas, but ultimately your own syllabus will reflect who you are as a teacher.

PHYSICS 265 INTRODUCTION TO PHYSICS SPRING 1997

Welcome to Physics 265. This course is a continuation of an introductory survey of physics which you began with Physics 215. We will discuss optics, electricity, magnetism, atomic and nuclear physics together with some interesting contemporary applications including microscopes, generation of electricity, X-rays, nuclear reactors, and magnetic resonance imaging. You will also improve your skills in analyzing problems and increase your understanding of the role and limitations of science. The course includes two lectures, one recitation-discussion period and one double-period laboratory each week.

Lecturer: R. Graetzer 107 Davey 863-xxx. Office hours: a) Tues 2:30-4:00 and Wed 3:30-5:00 or b) schedule an appointment or c) drop in. e-mail address: xxx@PSU.EDU

Text: *Physics* 4th edition by D. Giancoli and the new 215/265 laboratory manual. Other materials: electronic calculator with trig and log functions.

Lectures: W and F 11:15-12:05 in 117 Osmond or W and F 2:30-3:20 in 119 Osmond. We will develop basic concepts with the aid of demonstrations, color transparencies, video materials, sample problems and discussion of practical applications. You may obtain hints useful for homework, labs and tests. To prepare for each lecture you should read the assigned material and solve the assigned lecture homework problems in advance. This pre-lecture effort will help you to understand the lecture and demonstrations. The lecture homework problems should be completed and written in an appropriate form for handing in for grading. Lecture homework will be collected randomly: in lecture I will indicate which recitation sections are to hand in homework that period. Alternatively there may be brief multiple-choice quizzes during a lecture on some of the concepts we are studying. Don't hesitate to ask questions in lecture if something is unclear.

Recitation: one period on M or T. The small discussion group provides you an opportunity to clarify concepts, learn problem solving techniques and acquire interesting information. Participate actively. Quizzes will help you to prepare for mid-semester examinations. You are encouraged to study with a few classmates to prepare for recitation, but prepare the detailed problem solutions by yourself. Solutions to assigned homework problems will be posted a few days after the due date in a display cabinet in the Osmond lobby. Your recitation instructor will schedule office hours to give you additional help. Other assistance is available in the Learning Resource Center (LRC) located in 201 Osmond. The LRC will be staffed by recitation instructors from our introductory courses. A schedule of hours will be announced. Free tutoring for small groups can be arranged through the tutoring center in 220 Boucke. A list of tutors who can be hired is available in the Department of Physics office (104 Davey).

Laboratory: The laboratory exercises are an important component of the course. To be properly registered for the course, you must be registered for both Physics 265 and for the laboratory Physics 265P. If you haven't registered for 265P, do so immediately in the Department of Physics office. Labs will probably begin the week of January 27. Professor James Beatty is in charge of labs.

Examinations: Two evening mid-semester examinations are listed on the schedule below. Room assignments will be posted in the display case in the Osmond lobby. Please inform me of any conflicts at least 10 days in advance of the tests. A final comprehensive examination will be scheduled by the university scheduling office during the final exam period May 5-May 10. All tests will be multiple-choice based on material discussed in lectures, the text, recitations and labs. You may bring one 8 1/2" x 11" sheet of paper with any notes to each exam. Bring your electronic calculator.

Course grade: The examinations, laboratory, lecture homework and quizzes, and the recitation will be weighted for your final numerical score as indicated:

- 2 midsemester tests: 20 points each
- final test: 25 points
- lecture homework and quizzes: 20 points
- recitation: 20 points
- laboratory: 20 points

for a maximum of 125 points. (Note that failure in the lab automatically results in failure in the course.)

In the schedule below Ch = chapter and numbers in parentheses refer to sections within the chapter. Q indicates questions and P denotes problems at the end of each chapter.

Week of	*Recitation*	*Lecture(Wed)*	*Lecture(Fri)*
Jan 13	Ch23 (1,2) P2,4,5,7,11	Ch23 (3-6) 18,31,35,41,44	Ch23 (7-10) P48,52,54,64
Jan 20	Ch23 Q5,14,26,27 P43,57,65,77,83	Ch24 (1-5) P2,4,7,15,20	Ch24 (6-11) P28,30,41,56,61
Jan 27	Ch24 Q9,12,13,18 P5,12,21,42,58,67	Ch25 (1-6) P4,5,11,14,28	Ch25 (10-12) P30,39,53,54
Feb 3	Ch25 Q4,8,9 P2,37,41,57,63	Ch 16 (1-10) P6,11,14,17,23	Ch17 (1-5) P4,7,12,14,15
Feb 10	Ch16 Q4,8,13,18 P24,29,37,45,54	Review Ch23-25,16 **Test 1 6:30-7:45**	Ch17 (6-10) P18,24,30,33,35
Feb 17	Ch17 Q1,5,6,7 P37,42,45,48,62 Discuss test 1	Ch18 (1-4) P3,8,11,13,20	Ch18 (5-9) P23,28,33,40,45
Feb 24	Ch18 Q3,5,11,13 P9,18,30,57,64	Ch19 (1-5) P3,7,14,17,28	Ch19 (6-10) P30,40,41,43,50
Mar 3	Ch19 Q4,5,6,8,16 P51,71,72,79	Ch20 (1-4) P5,7,8,13,22	Ch20(5-9,11,13) P27,32,36,44
	Mar 10 Spring Break		
Mar 17	Ch20 Q3,12,14,16, 20;P48,51,53,61	Review Ch17-20 **Test 2 6:30-7:45**	Ch21 (1-5) P1,3,7,8,10,11
Mar 24	Ch21 Q3,6,16,17, 20;P9,14,21,24	Ch21 (6-8) P28,30,32,33	Ch22 (1-5) P2,3,7,11,12
Mar 31	Ch22 Q1,3,8 P10,30,33 Discuss test 2	Ch27 (1-5) P1,3,11,14,21	Ch27 (6-10) P26,37,43,49,72
Apr 7	Ch27 Q1,7,9,12,13 16; P22,39,53,61,65	Ch28 (1-6) P1,7,17,20	Ch28(7-9,11) P25,29,33,35
Apr 14	Ch28 Q1,2,10,15 P5,9,28,38	Ch30 (1-5) P6,13,21,25	Ch30 (6-11) P29,34,39,40
Apr 21	Ch30 Q1,4,5,7,11 P47,51,59,60,68	Ch31 (1-4) P11,14,17,25	Ch31 (5-9) P33,47,48,52
Apr 28	Ch31 Q1,4,8,13, 14,18 and review	Review Ch27-31	Review Ch 21,22

May 5-10 final exam- comprehensive but emphasizing material discussed after test 2. Time and place to be announced.

PSYCHOLOGY 213

Developmental Psychology
Spring, 1997 (TTh 8:00-9:15)

Syllabus

Professor:	Dr. Kelly Madole	TA:	Karen Jones
Office:	438 Moore Bldg.	Office:	254 Moore Bldg.
Telephone:	863-xxxx	Telephone:	865-xxxx
Office Hours:	T Th 9:30-10:30 (or by appt.)	Office Hours:	M 1-2, W 10:30 11:30 & by appt.
E-mail:	xxx@psu.edu	E-mail:	xxx@psu.edu

Course Description: In this course we will focus on the process of psychological development during infancy and childhood. Emphasis will be placed on theory and current research in prenatal development, language and cognitive development, and social and personality development. Material will consist of assigned readings and lectures. Although there will be a certain amount of overlap, material covered in the readings will not necessarily be covered in class and vice versa. If you miss a class, it is your responsibility to find out from a classmate what was covered that day.

Website: Using a Web-browser (e.g., Netscape) access the following address:

http://cac.psu.edu/~klm10/scholarly.html

Then follow the link for PSY 213, Spring 1997. Course information will be posted here, including the syllabus, quizzes (after the quiz has been given, of course!), and grades. You may also follow the link for PSY 213, Spring 1996 to view old quizzes, but be aware that the textbook was not the same.

Texts

Required: Berk, L.E. (1997). *Child Development* (4th ed.) Allyn and Bacon.

Optional: *Study Guide for Berk's Child Development.* Allyn and Bacon.

Examinations: There will be five quizzes and an optional final consisting of 25 multiple choice questions. Quizzes will cover material from both lectures and readings. The final will be given during the final exam period and will be comprehensive. You may replace your lowest quiz grade with your final exam grade, so if you are satisfied with your course grade after the five quizzes you may elect not to take the final. Dates of the quizzes are indicated in the course outline below.

Make-up quizzes: Because your lowest quiz grade will be dropped, make-up quizzes will be given only *under exceptional circumstances* and only if approval is obtained *in advance of the quiz.* If you miss a quiz, your lowest quiz grade will be zero and you can replace that zero by taking the final. It is NOT to your advantage to miss a quiz just because you know you can take the final. Take the quiz anyway, to familiarize yourself with the questions.

Extra credit: A "syllabus quiz" early in the semester will give you the opportunity to earn up to 5 extra credit points. In addition, you may earn extra credit points by participating in research. Experimenters will come to class with folders for you to sign up for participation. You may earn up to 5 extra credit points (1 point per credit hour) in this way. Extra credit points will be added directly to your total points. IMPORTANT: Keep track of the extra credit slips the experimenter gives you. This slip is your proof of participation. Because the final is so early, I cannot guarantee that I will have a record of your extra credit points before the final, so you MUST keep track of your own extra credit points.

Grading: Each quiz will be worth 50 points. Therefore, a total of 250 points are possible (plus extra credit). Grades will be given on the following basis:

A	234-250 pts.	B+	217-224	C+	192-199	D	150-174
A-	225-233	B	208-216	C	175-191	F	<150
		B-	200-207				

I will not give grades out over the telephone. Your grades will be posted as soon as possible (3-4 days) after each quiz on the first floor of Moore Building and on the class Web-page. You should also receive an e-mail grade from University Testing Service. Record your grades below so you can make an educated decision about whether you wish to take the final.

	Quiz 1	_____
	Quiz 2	_____
	Quiz 3	_____
	Quiz 4	_____
	Quiz 5	_____
+	Extra Credit	_____
		_____
	Total points	_____

If your total points are less than satisfactory, you may want to take the final. For example, if your total points are 197, your grade would be a C+. If you wanted to try for a B- (200 points), your final exam grade would need to be 3 points higher than your lowest quiz grade.

Academic Integrity: Dishonesty of any kind will not be tolerated in this course. The penalty for any form of academic dishonesty is a grade of F in the course.

Lecture	**Topics, Dates, Readings**	
1/14	Theories of Development	Ch. 1
1/21	Research Methods	Ch. 2
1/28	Prenatal Development	Ch. 3
2/4	**QUIZ 1**	
2/6	Brain Development	Ch. 5 (pps. 192-197)
2/11	Infant Perception	Ch. 4
2/18	Cognitive Development: Piaget	Ch. 6
2/25	**QUIZ 2**	
2/27	Information Processing	Ch. 7
3/6	Intelligence	Ch. 8 (pps.308-330)
3/10-3/14	Spring Break	
3/18	Language Development	Ch. 9
3/25	**QUIZ 3**	
3/27	Emotional Development	Ch. 10
4/3	Self and Social Understanding	Ch. 11
4/10	**QUIZ 4**	
4/15	Moral Development	Ch. 12
4/22	Gender Roles and Sex Differences	Ch. 13
5/1	QUIZ 5	

Final Exam: Monday, May 5, 6:50—8:40 p.m.

Tentative

Psy 213: Advice For Successful Performance

The following is adapted from "How to Succeed in Social Psychology", by Jay Hull.

Students in courses like this one often find they are not doing as well as they had expected, but they are not sure why. Psychology is a blend of different kinds of information: a body of research facts, some of which are consistent with prevalent theories, others of which are not. The exams in this course demand a knowledge of research facts and relevant theories together with an understanding of how those facts and theories relate to a common theme.

To do well in this course you should attend all of the lectures and read all of the material. Although Nittany Notes *might* serve as a back-up for details you might have missed during lecture, they should not be expected to replace your actual attendance at lectures. Taking your own notes requires you to think about, and process, the information you are writing down. Reading someone else's notes can give you the illusion that you know the material, when in fact you have not really thought about it in depth. Furthermore, Nittany Notes are only as good as the person taking them and I do not necessarily endorse their quality. A lecture missed or a book chapter skimmed is guaranteed to lose you points on the exam. However, reading the material and attending the lectures is not enough. In order to make a B or higher, you are going to have to know details and show an ability to integrate and apply what you know. If I went over something in class, or the book spent a paragraph discussing a topic, then that material is fair game. Given this approach to testing, it does not make sense to try to second guess what material will be on the exam. If I talked about it in class, if it was discussed in the readings, it is fair game for the test. The longer it was talked about in class, or the more it was discussed in the book, the fairer game it is.

How should you study? There is no easy answer. The best advice for someone who is not doing as well as he or she would like is as follows:

— You should read all of the material and attend all the lectures.

— When you are in class you should take notes. Take as detailed notes as possible without interfering with your ability to understand what I am saying. If you don't understand what I said, or if I am going too fast, please feel free to ask me to repeat it.

— Read the assigned material *before* class.

— Within 2 days following a lecture, look over your lecture notes. Rewrite your scribbled notes into text with complete sentences. You will be amazed at the extent to which this will help you remember details and "get the big picture."

— Start preparing for the exam several days in advance. Review the material in a way that is consistent with the test format. Try playing Jeopardy with the material. Make up questions for the material in the text or your notes.

— Get a good eight hours of sleep the night before the exam.

Appendix C: Sample Grading Standards and Plagiarism Handout

English 15 Grading Standards

These grading standards establish four major criteria for evaluation at each grade level: rhetorical situation, reasoning and content, organization, and expression. Since papers may have some characteristics of "B" and others of "C", the final grade depends on the weight the instructor gives to each criterion. A paper grossly inadequate in one area may still receive a very low grade even if it successfully meets the other criteria.

The "A" paper:

1. The "A" paper has an excellent sense of the rhetorical situation. Its aim is clear and consistent throughout the paper. It attends to the needs of its audience, reflected in attempts throughout to fit the subject and its presentation to a selected set of readers. The topic itself is appropriately narrowed and clearly defined.
2. The content is appropriately developed for the assignment and rhetorical situation. The supporting details or evidence are convincingly presented. The reasoning is valid and shows an awareness of the complexities of the subject. If secondary sources are used, they are appropriately selected and cited.
3. The organization demonstrates a clear, well-considered plan throughout. The introduction establishes the writer's credibility and the conclusion effectively completes the essay; paragraphs are coherent, well developed, appropriately divided, and clearly related to other parts of the essay.
4. The expression is very clear, accessible, concrete—at times even eloquent. It displays ease with idiom and a broad range of diction. It shows facility with a great variety of sentence options and the punctuation and subordinate structures that these require. It has few errors, none of which seriously undermines the effectiveness of the paper for educated readers.

The "B" paper:

1. The "B" paper has a good sense of the rhetorical situation. It shows sensitivity to audience and an awareness of purpose. Its topic has been clearly defined.
2. The content is well developed and the reasoning usually valid and convincing. Evidence and supporting details are adequate for the audience and purpose.
3. The organization is clear and easy to follow: The introduction and conclusion are effective, and transitions within and between paragraphs are clearly signaled.
4. The expression is competent but seldom felicitous. The paper has few errors, especially serious sentence errors. Sentences show some variety in length, structure, and complexity; diction is precise and fairly varied. Punctuation, grammar, and spelling conform to the conventions of edited American English.

The "C" paper:

1. The "C" paper has an adequate sense of the rhetorical situation. Its purpose is clear and focused on a central idea. The topic may be unoriginal, but the assignment has been followed, if not fulfilled.
2. The content is adequately developed. The major points are supported, and paragraphs are appropriately devised, with enough specific details to make the ideas clear. The reasoning is valid.
3. The organization is clear and easy to follow. The introduction and conclusion are adequate; transitions are mechanical but appropriate. Paragraphs may not be in their best order.
4. The expression is generally correct, although it shows little competence with sentence variety (in length and structure) and emphasis. The paper is generally free of major sentence and grammar errors and indicates mastery of most conventions of edited American English.

The "D" paper:

1. The "D" paper has a limited sense of the rhetorical situation. Its purpose may not be clear, its topic may not be interesting to or appropriate for its audience, and it may make few accommodations to its audience.
2. The content is inadequately developed. The evidence is insufficient, and supporting details or examples are absent or irrelevant. The reasoning may be flawed.
3. Organization is deficient. Introductions or conclusions are not clearly marked or functional. Paragraphs are not coherently developed or linked to each other. The arrangement of material within paragraphs may be confusing.
4. Expression demonstrates an awareness of a very limited range of stylistic options. It is marred by numerous errors in grammar, spelling, and punctuation. The syntax or diction is flawed in places so that comprehension is difficult.

The "F" paper:

1. There is no sense of the rhetorical situation. There is no clear purpose for the paper or no central point. It is not accommodated to any audience.
2. The content is insufficiently developed and does not go beyond the obvious. The reasoning is deeply flawed.
3. The organization is very difficult to follow. Sentences may not be appropriately grouped into paragraphs, or paragraphs may not be arranged logically. Transitions are not present or are inappropriate.
4. The number and seriousness of errors—in grammar, spelling, punctuation, diction, or syntax—obstruct comprehension.

ON PLAGIARISM

The Department of English insists on strict standards of academic honesty in all courses. Any plagiarism will be penalized severely. The following discussion has been prepared so that no student will commit plagiarism out of ignorance.

Plagiarism is the act of passing off someone else's work as your own.

Sometimes plagiarism is simple dishonesty. People who buy, borrow, or steal a paper to turn in as their own work know they are plagiarizing. Those who copy word-for-word—or who change a word here and there while copying—WITHOUT ENCLOSING THE COPIED PASSAGE IN QUOTATION MARKS AND IDENTIFYING THE AUTHOR should know that they are plagiarizing.

But plagiarism can be more complicated in act and intent.

Paraphrasing, which is stating someone else's ideas, can be a useful way to support your own ideas, but it can lead you unintentionally to plagiarize. Jotting down notes and ideas from sources—and then thoughtlessly using them without properly introducing them with attributions to the authors or titles of those sources in introductory phrases—may result in a paper that is only a mosaic of your words and those of others that appear, nonetheless, to be yours.

Another innocent way to plagiarize is to allow your fellow students and friends to give you too much rhetorical help or do too much editing and proofreading of your work. If you think you have received substantial help in any way from people whose names will not appear as authors of the paper, acknowledge that help in a short sentence at the end of the paper or in your list of Works Cited. If you are not sure how much help is too much, talk with your instructor, so the two of you together can decide what kind of outside help (and how much) is proper, and how to give credit where credit is due.

As they are drafting their work, conscientious writers keep careful track of when they use ideas and or words from sources. They diligently try to distinguish between their own ideas, those of others, and common knowledge. They try to identify which part of their work comes from an identifiable source and then document their use of that source in accordance with established academic or professional conventions, such as a parenthetical citation and a Works Cited list. If you are in doubt about what needs documenting, talk with your instructor.

When thinking about plagiarism, it is hard to avoid talking about ideas as if they were objects like tables and chairs. Of course they are not. You should not feel that you are under pressure to invent new ideas—which is probably impossible. So-called original writing consists of thinking through ideas and expressing them in your own way. The result may not be new, but if honestly done, it may well be interesting and worthwhile reading. Print or electronic sources, as well as other people, may add good ideas to your own thoughts. When they do so in identifiable and specific ways, give them the credit they deserve.

These examples should clarify the difference between dishonest and proper uses of sources.

THE SOURCE

> It is not generally recognized that at the same time when women are making their way into every corner of our work-world, only one percent of the professional engineers in the nation are female. A generation ago this statistic would have raised no eyebrows, but today it is hard to believe. The engineering schools, reacting to social and governmental pressures, have opened wide their gates and are recruiting women with zeal. The major corporations, reacting to even more intense pressures, are offering attractive employment opportunities to practically all women engineering graduates.
>
> From Samuel C. Florman, "Engineering and The Female Mind" Copyright by *Harper's Magazine*

WORD-FOR-WORD PLAGIARIZING

In the following example, the writer devises part of the first sentence in hopes the reader won't notice that the rest of the paragraph is simply copied from the source. The plagiarized words are italicized.

> Because women seem to be taking jobs of all kinds, few people realize that *only 1 percent of the professional engineers in the nation are female. A generation ago this statistic would have raised no eyebrows, but today it is hard to believe. The engineering schools, reacting to social and governmental pressures, have opened wide their gates and are recruiting women with zeal. The major corporations, reacting to even more intense pressures, are offering attractive employment opportunities to practically all women engineering graduates.*

Quotation marks around all the copied text, followed by a parenthetical citation, would avoid plagiarism. But even if that were done, a reader might well wonder why so much was quoted from Florman. Beyond that, a reader will wonder why the writer chose to quote instead of paraphrase this passage, which as a whole is not very quotable. Furthermore, a paper consisting largely of quoted passages would be relatively worthless.

PLAGIARIZING BY PARAPHRASE

In this case the writer follows the progression of ideas in the source very closely—too closely—by substituting his or her own words and sentences for those of the original.

Original	**Paraphrase**
It is not generally recognized that at the same time when women are making their way into every corner of our work-world, only 1 percent of the professional engineers in the nation are female.	Few people realize, now that women are finding jobs in all fields, that a tiny percentage of the country's engineers are women.
A generation ago this statistic would have raised no eyebrows, but today it is hard to believe.	Years ago this would have surprised no one but now it seems incredible.
The engineering schools, reacting to societal and governmental pressures, have opened wide their gates and arebig recruiting women with zeal. The major corporations, reacting to even more intense pressure, are offering attractive employment opportunities to practically all women engineering graduates.	Under great pressure, engineering schools are searching out women, and companies are offering good jobs to practically all women who graduate with engineering degrees.

The writer appears to be generating his or her own ideas. In fact they are Florman's ideas presented in the writer's words without acknowledgment. The writer could avoid plagiarism here by introducing the paraphrase with an attribution to Florman and following them with a parenthetical citation. Such an introduction is underlined here:

> Samuel Florman points out that few people realize. . . .(page number).

Properly used, paraphrase is a valuable technique. You should use it to simplify or summarize so that the ideas or information, properly attributed in the introduction and documented in a parenthetical citation, may be woven into the pattern of your own ideas. You should not use paraphrase simply to avoid quotation; you should use it to express another's ideas in your own words when those ideas are not worth quoting verbatim.

MOSAIC PLAGIARISM

This is a more sophisticated kind of plagiarism. The writer lifts phrases and terms from the source and embeds them into his or her own prose. Words and phrases that the writer lifts verbatim or with slight changes are italicized:

> The pressure is on to get more women into engineering. *The engineering schools* and *major corporations have opened wide their gates and are recruiting women zealously. Practically all women engineering graduates can find attractive jobs.* Nevertheless, at the moment, *only 1 percent of the professional engineers in the country are female.*

Mosaic plagiarism may be caused by sloppy note taking, but it always looks thoroughly dishonest and will be judged as such. In the example above, just adding an introduction and a parenthetical citation will not eliminate the plagiarism since quotation marks are not used where required. But adding them would raise the question of why the writer thinks those short phrases and basic statements of fact and opinion are worth quoting. So the best solution is to paraphrase everything: recast the plagiarized parts in your own words, introduce the passage properly, and add a parenthetical citation.

SUMMARY

Using quotation marks around original wording avoids the charge of plagiarism, but when overdone, makes for a patchwork paper. When most of what you want to say comes from a source, either quote directly or paraphrase. In both

cases, introduce your borrowed words or ideas by attributing them to the author and follow them with a parenthetical citation.

The secret of using sources productively is to make them work to support and amplify your ideas. If you find, as you work at paraphrasing, quoting, and citing, that you are only pasting sources together with a few of your own words and ideas—that too much of your paper comes from your sources and not enough from your own mind—then go back to the drawing board. Try redrafting the paper without looking at your sources, using your own ideas; only after completing a draft should you add the specific words and ideas from you sources to support what you want to say.

If you have doubts about the way you are using sources, talk to your instructor as soon as you can.

Appendix D: Sample Feedback Questionnaires

A Guided Self-Analysis for Beginning Instructors

Teaching is a complex process that rests in large part on the quality of the exchanges between students and teacher. As is true of any complex skill, becoming a good teacher requires both careful self-analysis and feedback from others. Getting feedback from your students is a good way to develop better teaching skills. However, before asking your students for feedback about your teaching, it will be helpful if you first take a few minutes to analyze or reassess your goals and teaching strategies by asking yourself questions such as the following:

1. How did I decide on the pace of this course, and have I modified the pace at all thus far?

2. When I use the chalkboard, do I:
   ___make an effort to write clearly, carefully, and slowly?
   ___repeat aloud what I have written on the board?
   ___generally cover the board from left to right?
   ___erase only after students have had sufficient time to read and copy?

   Are the problem solutions that I put on the board or overhead sufficiently complete that I would give them full credit if they occurred on a student's exam?

3. What kinds of classroom interaction with students do I want to encourage, and why?

   When a student asks a question that I do not understand or seems dissatisfied with my initial response, how do I follow up?

4. What efforts am I making to help my students understand how to use their textbook and other course materials most effectively?

5. How do I select exam questions, homework problems, and/or other assignments? Do I try out my questions on colleagues before making out the exam, and work problems *before* assigning them?

Midsemester Student Feedback Questionnaire

Instruction is most effective when there is a good fit between student and teacher. Creating a good fit requires feedback—both from teacher to student and from student to teacher. This questionnaire has been designed to help me learn about those aspects of my teaching that have been the most and the least useful to you thus far. Most of the questions are fairly open-ended, so please be as descriptive and constructive as possible. Feel free to use the back of this sheet if you need more space. Thank you.

1. The pace of this course is (check one):
   ___too slow ___too fast ___about right

   If you checked either "too fast" or "too slow," what would you like to see changed?

2. How effective do you find my use of the chalkboard, overhead projector, and other classroom equipment? (Any tips would be appreciated.)

3. Do you generally feel encouraged to ask questions/contribute comments in class?
   ___Yes ___No

   If so, what has encouraged you the most? If not, what could I do to make it easier for you to participate in classroom interactions?

4. How are you using the textbook and other course materials? (Please be specific.)

5. Please comment on tests and assignments. In what ways is the feedback you receive on these helping or hindering your accomplishment of course objectives?

Guide to Classroom Observation

Before an observation, the observer and the class instructor should get together for a pre-session. Discussing and agreeing on answers to the following questions will help you at this important planning stage:

1. What do each of you hope to learn from the classroom observation experience?

   What feedback from students and/or others does the instructor already have?

   What follow-up questions or concerns does the instructor want the observer to look for and address?

   What other things is the observer planning to look for?

2. What can the observer expect?

   What are the course goals?

   How are sessions typically conducted, and will the session to be observed be different?

   What is students' typical response to planned activities?

3. What effect is a classroom visitor likely to have?

   Will students notice? Will they have questions?

   How, if at all, should the observer's presence be acknowledged?

   Is the observer expected to participate in classroom activities and, if so, to what extent?

After the observation, the class instructor and the observer should schedule a post-session, at which they can consider the following questions:

1. What was the overall impression of each party?

   Did the session go as expected? Were there any surprises?

   Can the observer directly address questions or concerns the instructor raised in the pre-session?

2. How would the observer describe the instructor's relationship with students?

   How effectively were student questions addressed?

   How comfortable did students seem interacting with the instructor and each other?

3. What is the observer's response to the instructor's presentation of key concepts and illustrative examples or demonstrations?

   What alternatives would the observer recommend, and why?

4. What is the instructor's response to these observations? How will they be followed up?

Appendix E: Philosophies of Teaching

As we have suggested throughout this handbook, certain fundamentals of good teaching do exist, but teachers put these fundamentals into practice in very diverse ways. This diversity is, perhaps, nowhere more evident than in the teaching philosophy. At the most general level, your teaching philosophy reflects who you are as a teacher and your own definition of good teaching. The individual and personal nature of the document, however, ensures that every teacher's philosophy will be unique.

To demonstrate the individuality expressed in the teaching philosophy, we have gathered philosophies from several Penn State teachers. Some of these teachers have been recognized as Alumni Teaching Fellows, while others are past participants of CELT's Course in College Teaching. Each philosophy offers a glimpse of an individual approach to teaching, but together they display the range and variety of good teaching at Penn State.

Statement of Personal Teaching Philosophy

HARRY H. WEST

Professor, Department of Civil and Environmental Engineering
Alumni Teaching Fellow, 1996
Lindback Award, 1990

Effective teaching requires the synthesis of a broad array of activities to provide an environment that enhances learning. The instructor's role is to orchestrate the process through the presentation of relevant and interesting lectures, the formulation of challenging exercises designed to apply the subject matter, and the provision of fair and effectual evaluations of student performance and comprehension.

One of the most important attributes of an effective instructor is the ability to convey a genuine sense of excitement about the subject matter that he or she is then, in turn, able to transfer to the students. Thorough preparation on the part of an instructor in all aspects of the instructional process is vital in order to make efficient use of student time and energy. Students should not be frustrated because an instructor has not given adequate attention to the development of any component of the course. Further, it is crucial that an instructor be available to and approachable by students in a systematic manner and that he or she be fair and sensitive in the treatment of all students. In addition, an instructor must realize that he or she is serving as a role model and must act with integrity and in a thoroughly professional manner.

In summary, an instructor should strive to exhibit the qualities that he or she would most like to see if the instructor-student roles were reversed.

Statement of Personal Teaching Philosophy

FERN K. WILLITS

Professor, Department of Rural Sociology
Alumni Teaching Fellow, 1995

I have been privileged to teach at Penn State for three decades. During that time, I have come to believe that there is no magic formula or set of gimmicks that will make someone an effective teacher. Rather, the effectiveness of one's teaching efforts depends upon the nature of the dynamic interactions of instructor, student, and subject matter that occurs in the teaching-learning situation. At the same time, I believe that certain elements are likely to contribute to teaching effectiveness—and they have been important to my efforts through the years. First, it goes without saying that an instructor must be knowledgeable of the specific subject matter being taught. However, the objective of teaching is *not* to document the instructor's expertise, but to help each student arrive at a useful level of understanding of the subject matter. With that in mind, a dynamic and ongoing task of instruction is to continuously develop and improve the means of explicating, organizing, and directing the learning process in response to the needs of each group of students. For me, it is also important that I feel and express the notion that the subject matter *is* relevant, important, and absolutely fascinating. In my judgment, there is no substitute for personal infectious excitement on the part of the instructor. For me, each new class provides a cadre of intellectual recruits with whom I can share the excitement.

Second, students must become engaged in the learning process. No matter how brilliant, thought-provoking, or interesting an instructor's presentation, to obtain a deep and personal understanding, students must themselves work, practice, apply, discuss, and explore the materials. I feel strongly that course requirements should be rigorous, with students expected (required) to attain more than superficial mastery of the subject matter. I encourage student-subject matter involvement by: (1) providing prompt and detailed feedback on extensive written assignments which are designed to be reworked until they meet standards of quality and completeness; (2) scheduling frequent, announced, open-book quizzes that encourage and reward students for keeping abreast of the materials—quizzes which are graded and returned without delay to allow for timely individual assessments of progress; (3) utilizing a system of retesting in which students may, if they wish, take a second quiz on any unit, not simply to "raise one's grade" but to provide an opportunity to revisit the subject matter and to learn from previous mistakes; (4) providing equitable access to example problems, old quizzes, and test keys, as a means of helping students to focus on key concepts and encouraging student-to-student discussion of these issues; and (5) being certain that individual help is available from the instructor and/or a competent and dedicated assistant, both in and outside of class, so that students have the opportunity to revise and rethink erroneous or incomplete conceptions and to explore new and related linkages.

In approaching each class, I assume that my students are motivated, hard-working, and conscientious. I also assume that they are human beings with frailties of health, family obligations, assistantship or job responsibilities, and other course commitments, which must all be continuously juggled. No two students share exactly the same mix of conflicting and competing expectations. Yet, as a teacher, I am concerned with helping each to maximize his/her learning in my class. The key, I believe, is *flexibility*. The student who isn't feeling well, who has a family crisis, who is inundated with extra job-related tasks, or who simultaneously has tests or papers due in other courses is not in a position to maximize his/her learning in my course. If by extending a deadline, rescheduling an exam, or giving a deferred grade, I can make it possible for that person to better come to terms with the course material, such action is, in my judgment,

appropriate and desirable. Of course, students do need to learn time-management skills as well as substantive information. But I believe that these skills are most meaningfully acquired in a situation where individuals are allowed the flexibility to balance their own responsibilities and partially define their own deadlines.

Much of my work here at PSU has focused on the teaching of research methods and applied statistical analysis in the behavioral and biological sciences. Only a minority of the students I teach will go on to become researchers themselves. However, I strongly believe that, to be most effective throughout their careers, professionals in any field need to stay abreast of knowledge and developments in their areas of interest by reading and understanding reports of ongoing research. Since much research involves the use of experimental designs and statistical analysis, it is imperative that they be able to interpret the meanings of these techniques. Moreover, people in all walks of life can better understand and evaluate the barrage of research findings that has become part of the daily news if they have some knowledge of probabilistic thinking and the processes of scientific decision-making. In my teaching, I seek not only to encourage budding researchers to master the elements of scientific inquiry and statistical analysis, but also to teach these "consumers" of research.

While we often think of teaching as involving direct and deliberate actions and the instruction of technical or specialized subject matter, it can also be indirect and unanticipated. Like it or not, teachers are often taken as role models by students. I am always quite amazed to encounter dimly remembered former students who contact me after many years to describe in effusive detail the impacts I have had on their lives. It is humbling and a bit scary to realize that aspects of one's behavior, expressions of attitudes, and orientation that may seem quite inconsequential can, in fact, have long-range and profound impact on others. It is also extremely gratifying.

Statement of Personal Teaching Philosophy

JOHN LOWE

Professor, Department of Chemistry
Alumni Teaching Fellow, 1993
AMOCO Foundation Award Winner, 1985

There are two broad goals that motivate the way I design my courses, manage the classroom, and seek to control home-study activities. One is the subject-specific goal that concerns acquiring a specific body of knowledge and skills. The other is the goal of guiding the student toward becoming an independent, motivated adult with the self-assurance that comes from overcoming significant challenges.

I have learned that sharply defining either of these goals is surprisingly involved. One might think that the body of knowledge and skills associated with a particular course, like Physical Chemistry, would be widely agreed upon, but this is not the case. As I have become a more experienced teacher, I have become more aware of the extent to which the actual material in a course takes a back seat to the general development of students as confident and enthusiastic problem-solvers, and the extent to which we make the mistake in many of our courses of assuming that the goal is simply coverage of a certain amount of material.

Of course, science is a vertically integrated subject, and that means that it *is* important for course A to cover the material necessary to progress to course B. Herein lies the challenge: How can I do a good job on traditional coverage and simultaneously foster the broader developmental goals that are so important? I have settled on a simple formula for

achieving these goals—one that seems to work well for my students. I *challenge* them, and I make the learning experience as *interactive* as I can.

In my 25 years of teaching Chemistry at Penn State I have taught courses falling into three major categories, and have found that providing appropriate challenges and opportunities for interaction requires rather different strategies in these three categories.

The first category is represented by Chem 451-452 (ca 200 students), a physical chemistry course taken by certain professional majors. In this course, simply requiring that the students really understand the material provides ample difficulty. These courses are probably the most difficult that many of these students take in their entire career because they bring the theories of physics and the "language" of mathematics to bear on chemical phenomena. My experience has been that I can turn at least some of the students from a position of fear for the subject and desperate rote learning to a position of enthusiasm as they discover that the mathematics they experienced earlier really does have physical meaning and scientific use, and that they can "read" complicated equations to extract a physical picture. For some, this is a real high, and consequently it is for me too. I can only make this work, though, by convincing students that they will fail if they don't approach the material on my terms (i.e., to understand rather than memorize). I achieve this by asking examination questions that are truly challenging. For many, the first examination is a shock. I like to provide this shock very early, while behavior modification is still possible, and I also feel that I must provide enough examinations that students can overcome an early disaster. Therefore, I now give four evening examinations and a final in these courses.

It is also important that students come to class ready to understand what is being discussed, and so I require that they turn in a daily problem. These problems carry a small weight (about 7% of the total grade), so students are motivated to turn them in, but do not gain that much in points if they simply copy another student's work. They quickly come to realize that these problems focus on the most important concepts and therefore are central to success on examinations. Anyone who turns them in without actually learning from them suffers major loss on examinations. Solving the problems requires keeping up with the assigned reading, so my goal is met. Additionally, since students are keenly interested in finding out whether they got the right answer, I know I will have peak interest when I solve that problem, and so naturally choose problems that illustrate the points I most need to emphasize or clarify.

Finally, I like to use an "interaction tool" to keep students on their toes and also to emphasize certain tricky points. In physical chemistry courses, that tool is the "candy quiz." At the appropriate moment I pick up a candy bar from the table and say, "time for the candy quiz." Then I present the question. The first student to shout "got it!" and give the correct answer (with explanation) gets the candy bar. This subject is sufficiently full of unexpected surprises and disguised relationships to make this a very good way to highlight a point, and it rarely fails to bring some students up after class to ask me to go over the point again. Establishing this somewhat formalized version of interaction primes the pump, and I can ask numerous questions throughout the lecture and expect students to respond. It also means that they feel that they can interrupt with questions. The whole atmosphere becomes much more alive.

The second category of courses includes Chem 012, the introductory course for all the professional majors in science and engineering. This course involves material less conceptually slippery and less unfamiliar to most of the students. Here the challenge is getting them to see *through* the material—which most of them have learned and expect to relearn in a very superficial way—to the powerful underlying ideas that govern molecular behavior. Again, I rely on meaningful, challenging tests (as early as feasible), especially in honors courses, where students are typically just entering college with the idea that they know everything already. These are courses with lots of opportunities for demonstrations which serve as entrees for questions about what is happening. I try to communicate the notion that there is a good deal that they are responsible for that will *not* be discussed in class, and I make sure to reinforce this on tests. I think one of the greatest misunderstandings students have on entering Penn State is that everything will be

discussed in class, just like in high school, and that it won't appear on tests if not covered in class. In this course I seek to disabuse them of this notion as quickly as possible.

The tool for interaction in this course is the "Gotcha!" game. Like a candy quiz, the prize is a candy bar. But now I don't announce anything. Instead I simply make a mistake in some explanation or in solving some kind of problem. The first student to shout "Gotcha" and explain the error gets the candy bar. This works well in a course where the students already have a fair idea of what is going on. It also works well for huge classes of 400 or smaller ones of 50. Naturally, I try to choose mistakes that I know they commonly make on exams. Again, it is a good highlighting tool, and we all have good fun with it.

The remaining category is represented by Chem 001, a breadth course for nonscience majors. I was mainly responsible for designing this course, and I was careful to keep the focus on the breadth course goals in science, which are more attitudinal and conceptual than content-specific. Examinations in this course emphasize much more the way ideas have developed over the history of the molecular sciences, and how we can understand molecular behavior in terms of qualitative ideas. It is *not* a computational course, which relieves a lot of anxious students.

This is a course that puts unusual emphasis on writing. Students turn in ten or twelve short writing assignments during the semester, and these account for a fifth of their grade. Most of these are written in the form of a letter to a friend, parent, etc., and describe what they learned from reading an optional chapter in the text. This is a very easy format for students and takes a lot of the stress out of writing. It provides me a way to expand and control their out-of-class commitment and also produces a safety valve for anxiety about tests grades since it has a very strong positive effect on their final score. I read these myself and find it a valuable (and charming) way to meet my students.

I find teaching this course to be a real challenge because so many students, almost all of them really, didn't like earlier science courses and wish they didn't have to take this one. At University Park the class has about 150 students. Getting participation going here requires a different strategy. No one is likely to shout "gotcha" in a group like this one! Here I have devised a more blatant tool. I tell them that participating in class is desirable, and that any student who answers any question I ask in any way, or who asks a question, will get a "participation point" for that day. Accumulation of sufficient participation points will translate to one or two additional points on their final course average. It works. Some students participate very regularly. This really affects the tone of the class and certainly helps me since I am occasionally asked to re-explain something by one of the more vocal members of the class.

I have described ways to create challenge and participation. I must add a note about the obvious danger of stretching students past the breaking point. I find it important to give signals encouraging students having problems to talk to me. I go out of my way to be approachable. While I don't ever feel that the challenges I present are unreasonable, I must allow for the fact that even reasonable challenges can be overwhelming for individual students at various times for various reasons.

Why I Teach

LARRY D. SPENCE

Associate Professor, Department of Political Science
Alumni Teaching Fellow, 1992
Lindback Award Winner, 1986

A "teaching philosophy" is a set of general principles used to guide practice. Mine is mostly secondhand, gained by reading John Dewey, Albert J. Nock, Jacques Barzun, and Eugene Meehan. Some of it is informed by the many good teachers that I encountered in my education, and some of it is shaped by the insistent and critical students I have taught since first entering a college classroom as an instructor in 1965. The principles I have at hand today are chipped and worn by the practice of years. I suppose that makes the philosophy mine. Fortunately, it also makes it brief.

Teaching is a craft. Like any manual craft, it deals with tasks that must be done and re-done every day. Each day of teaching brings failures, triumphs, crises, and delightful surprises. But it is always difficult. No class, no lecture, no assignment is ever perfect. Only with great effort can they be made acceptable. Let attention slip and you get a disaster. Try too hard and you get worn out. Pace, patience, and attention to detail get you through, more or less. Conversely, teaching is not mysterious and grand, nor is it a science or a set of solutions to the problems of ignorance.

Teaching and learning go together, but they are done by different people. Thus, the match is incomplete. Learning can happen without teaching, and teaching can happen without learning. If I teach well, you will learn—but my teaching won't make you learn. It will only open opportunities for you to learn. If I teach and you don't learn, I have failed in some way. I'll be tempted sorely to say it's your fault, but if I do that and believe it, my chances to improve the practice of my craft are over. Teaching is not the transmission of information, culture, values, or skills. It is the arrangement of conditions—a talk, a text, or a test—that is conducive to learning. Like gardening, teaching is an activity that organizes natural processes to produce reliable results with a lot of sweat. It can be done with jumping enthusiasm and the singing of motivational hymns, or it can be done subtly with insight and much silence.

When we know something, we can say it and write it. Most of my daily work has to do with getting students to write often, taking the time to correct carefully what they have written, and then keeping them rewriting until it is acceptable. I conduct my classes to get them to say what they know and to hear useful criticism. Both activities get tiresome. I have never liked to correct essays even though I take some joy in improving writing skills. Class discussions are plagued by students who think they are in a rap session and also by unexpected turns of debate that lead down dark and blind alleys. The first plague requires an insistent demand for the justification of all assertions. The second requires preparations that are nearly exhaustive so that all the twists and turns of dialogue can be led back to the day's objectives.

Teachers aren't born, but talkers and entertainers are. Talkers and entertainers can become good teachers, but so can quiet and shy people. Like any enduring craft dealing with recurring difficulties, teaching is demanding. To pretend that we can mechanize it, ignore it, or practice it with our spare mind and energy is to demote it to a ritual or bureaucratic procedure. When we fail, the demands of the craft and the learning of students become fitful and haphazard. Today we witness this result in an intellectually unprepared student body mostly unable to carry out the basic activities of learning—competent reading, clear writing, and accurate calculation. We see the results, but we can't seem to face the failure. Teaching is even harder today because it is invisible. No other activity is so beleaguered and so misunderstood in American society. In the research university, it is as if we all are living in a grand house where everyone either refuses to cook, wash dishes, and clean, or refuses to recognize that any fellow creature has been condemned to do so.

To my surprise, I have found that learning begins with failure. If the student already knows, there will be no mistakes and no need for learning. Most learning is drudgery, frustration, and humiliation. Learning is work, not fun, and

if it does have its joys, they must be earned. A teacher arranges for students to make significant but harmless mistakes and then corrects those mistakes by means of explanations and exercises. Teachers cause students a lot of bother and sometimes pain. While mistaken students should be dusted off, patted, and encouraged to try again, they must be corrected carefully. To all this, students respond with hostility and rightly so. Teaching is invasive.

Perhaps the hardest part of teaching for me has been learning not to cave in to that hostility and its accompanying complaints and criticisms. I do two things to become stronger. First, I never ask for student evaluations of my teaching because the questions now in use ask, at best, that the student appraise the communicative skills of the teacher. A beginning teacher can profit from such criticism, but once you get the mechanics of classroom conduct down, you don't need it. At worst, those questions ask students if they like me, like my subject, my assignments, and my tests. But good teaching does not produce liking; it induces the trials of learning. I want to see my students improve at learning until they become self-teachers and leave me to tackle the next cohort. If that means they don't like me or what I do, I have to live with it.

The second thing I do is to take courses every year in subjects in which I begin as a poor learner. Classes in modern dance, masonry, swimming, small-engine rebuilding, auto repairs, and cabinetmaking return me to the strife and tension of learning. As the oldest, fattest, and stiffest member of a dance class, I experience the bitterness of failure, the embarrassment of being corrected, and, finally, the hard-won joy of a good performance. In these classes, I discover again that learning takes place in stages—long desolate plateaus where all efforts seem to lead nowhere. Becoming a student again each year helps me understand the difficulties my students face and yet gives me the distance I need to push them through their failures and demand of them their best.

The troubles that all teachers face with more or less difficulty—the demands, the hostility, the intrusiveness, the issues of fairness, and the temptation to try to make souls in our own image—come in unique forms with each class and each student. They can only be worked out, as Barzun writes, hand to hand, face to face, and every day. Can there be a better vocation for someone who loves words, ideas, books, and people?

The Art of Teaching[68]

JACKSON J. SPIELVOGEL

Associate Professor, Department of History
Alumni Teaching Fellow, 1988

Teaching has been one of the great love affairs of my life. It seemed to come naturally to me. I remember my first teaching experience at the age of five when I organized a class in the grape arbor behind my house. I even wrote a little text of readings to go along with the lesson. I love teaching. And it's something that I've always experimented with during my 30 years as an academic.

To me there are three fundamental principles that are involved in the art of teaching. The first of these is communication. I don't know what specialists in speech communication mean by communication, but I'll specify what I mean by it. First of all, to me communication is the ability to express ideas, concepts, and thoughts clearly. One of the things that I have always attempted to do as a teacher is to take any particular set of ideas—whether it's the theories of Karl Marx or the ideas of Voltaire—and try to explain them to students in such a way that they will not only be able to understand them, but also be able to interact with me about them. In other words, clarity of thought is something that we strive for

[58] Excerpted from "The Art and Craft of Teaching," originally given as an IDP Master Teacher Seminar on February 12, 1992.

as teachers, and it is something we try to help our students achieve as well. If we want them to have clarity of thought, we too must have clarity of thought.

Therefore, being able to communicate becomes a very important part of what we're doing in the classroom. However, communication as it relates to teaching is more than just thinking clearly and explaining ideas clearly; it is also the embodiment of who and what we are and the values we hold as teachers. We are, after all, role models for students in the sense that we obviously have certain ideas, certain values, certain things that we want to communicate, and what we do and how we do it in the classroom communicates those ideas and values. So it's not just a matter of expressing them clearly; it's also a matter of actually being what we are talking about. And in the process of being what we're talking about, we communicate automatically.

The second fundamental principle of the art of teaching is that we must have clarity of purpose. What are we trying to achieve as teachers? I am trying to be an instrument of empowerment. Students have their own beings that they are trying to express. Therefore, as a teacher, I do not try to indoctrinate them with certain ideas and thoughts that I insist they must know—that's not teaching. Instead, I try to educate. The word comes from the Latin *educo*, meaning to lead out of. As teachers we're trying to lead out of our students, to get them to understand themselves and thus enable them to understand the world in which they live as well. As teachers we have a responsibility to help our students find out who they are—not just the brightest of our students, but all of them. Before this can happen, we must ask two questions of ourselves. The first question is, what can students learn from me that will help empower them? Secondly, what can I learn from my students that will empower me? It seems to me that this is a reciprocal process. It's not just a question of giving something to them; it's also a question of allowing ourselves to receive something from our students when we teach.

This brings me to my third principle, what I would call my love of students. I believe that part of the essence of teaching is the love that you bring to people. I know that love, like God or spirit, is not a fashionable term in universities these days, but being fashionable has never been one of my particular life concerns. The joy of teaching is measured in the excitement that comes when a student lights up with a new idea or new way of looking at something. It is the joy that comes when students tell you that you taught them how to think or you helped them to enter the world outside the university as better human beings. We need students as much as they need us. If we refuse to take them to heart, they become a burden or inconvenience. I find that this love is something that needs to be expressed.

I've recently been delighted to read similar kinds of things in the literature on teaching. For example, in an article in *The Craft of Teaching*, Kenneth Eble writes:

> John Grandrose calls attention to teaching's greater mysteries, deliberately borrowing that term from theology. Grandrose refers to the marks of confidence and craftsmanship in one's profession that are not so much advanced skills as marks of character and engagement and love. He goes on to observe that they receive little attention because they are embarrassing to talk about. Yet teaching would be a less satisfying, less demanding profession were it not for the fact that every committed teacher works within the possibility that a student will say, "You changed my life." To teach without some awareness of that possibility is to sell short teaching's greater mysteries. "To wake our students up we ourselves must be awake." Grandrose writes. "To inspire them, we ourselves must be inspired. To love them, we must be loved ourselves."

Realizing that love and caring are central to our endeavor is a very important part of effective teaching.

Teaching Philosophy

SYDNEY ABOUL-HOSN

Instructor and Graduate Student, Comparative Literature
CELT Teaching Fellow

As a long-time doctoral student and instructor in the Department of Comparative Literature, I have had the pleasure of teaching half a dozen different courses with classes ranging in size from 25 to 350 students. For the first few years, I quite frankly didn't think about any kind of teaching philosophy other than my enjoyment of world literature and my excitement about sharing it with students. Over the semesters, however, I have come to believe that really good teachers do have some kind of "mission" which they undertake in every class they teach.

For those of us who teach in the humanities, and especially literature, it is critically important to define a philosophy because our goals are often intangible and seem very vague to students. In today's practical world, it is unfortunate that the notion of personal growth is often not a motivating factor for students—they want to know how a course will make them more marketable.

I refuse to give my courses an "earnings potential" value, but I believe that defining a teaching philosophy and sharing it with students can help them appreciate the value of the class.

I used to believe that it was enough to get students to read and understand literature. But in the past few years, I have come to believe that exposure to other cultures through world literature can lead to improved social climates and ultimately, world peace (call me idealist!). In order to realize these lofty goals, it is imperative that students see literature as relevant and personal. They must be able to imagine themselves or someone they know in the texts they read, or they must be able to empathize with literary characters. So my applied teaching philosophy has been to present literary materials in such a way as to make characters real and current for students. This can be done in many ways, including asking students how they feel about characters or asking them to visualize themselves in situations which would make them feel the same way as the characters do. At first students resist this kind of personal connection with fictitious or distant people, but it doesn't take too long before they are making comments such as "This character reminds me of my best friend," or "I felt just like Anne Frank last year when I. . . ." It is amazing how students are eventually able to "identify" in one way or another with characters and situations in literature that is thousands of years old. This becomes a starting point for detailed literary analysis and for personal cultural awareness.

Once I am able to articulate the relevance of literature, I believe that I am better able to determine what exactly I want students to learn and retain from the texts I teach. I believe that relating the material to students' own experiences and reactions makes them better able and willing to use the tools I try to give them to be better human beings as well as more articulate learners. This is the true definition of a "liberal arts" education.

Teaching Philosophy

TIMOTHY R. BAKER

Assistant Professor, Department of Forestry
Penn State DuBois

I began learning about the way forests work at a very young age from walks with my father who was a forester. Learning about the biology of forests has evolved into a strong desire to teach others about how we think these systems function. Two distinct things stand out from almost 30 years of looking at the natural world: everything out there is related and there is a lot more of it than I had ever suspected in the third grade. Those two things strike at the heart of the problem of teaching others about any particular aspect of the natural world: how to limit the topic without severing it from the whole and how to show where the topic fits within the whole.

I use a hierarchical framework to teach how topics are integrated into natural resource issues. Within this framework, I try to show the students where in the overall realm of possibilities a particular subject fits and examine in detail the basic theory behind the current thought in the subject. Then I use practical examples (e.g. a timber cruise, a plant survey, ecological classification, etc.) to show how the basic theory works out in the world. I have always believed that understanding *why* we do a thing is as important as *how* we do a thing because, it is from an understanding of the *why* that you show students the process of learning. If they know why we do something in a particular way, students can then learn how to adapt techniques to whatever situation they find in the field. And too, it is how we invite innovation and critical thinking into any topic.

I believe another key to teaching is to make the subject interesting to the student; to make the experience an enjoyable one even if it is also a difficult one. Without active interest from the student, no amount of instructor imposed work is going to result in fruitful learning experience. With active interest students will continue to learn about a topic long after they leave the classroom and be more inclined to integrate knowledge about the topic into the general framework. I truly enjoy being out in the woods and in learning about the inhabitants and how they exist and I try to impart this enthusiasm to the class.

Philosophy of Teaching

KELLY BRICKER

Graduate Teaching Assistant, Department of Leisure Studies

Teaching is an enormous responsibility and privilege sought by those with a desire to enhance the lives of others. To serve a profession that strives to create an atmosphere conducive to inquiry is indeed a prized endeavor. Teaching is about developing an avenue by which students expand their capability to explore and learn. When I try to recall the courses that have made a lasting impression on my life, it was not so much the content of what I learned, but that I was *empowered* to learn.

Teaching should inspire an individual to explore, investigate, challenge, integrate, comprehend, create, and "test the waters" of concepts, facts, and ideas. Teaching should also recognize the educational benefits inherent to both success and failure, ultimately creating an environment that allows students to experience triumphs and tribulation as

part of a comprehensive educational process. In the wake of either success or failure, the teacher encourages one to keep trying by providing the tools and support necessary to reach one's full potential.

To teach does not suggest that one has all the answers, nor does one attempt to provide all of the answers. The answers, and perhaps even more, the questions, are discovered through a mutually beneficial exchange of interactions between student and teacher. One cannot understand teaching without comprehending a clear understanding of what it is to learn. Learning happens individually and at different levels through various experiences. As teachers, it is important that we tap into some relevant corridor that carries students from theoretical concepts to practical approaches to realistic solutions. Teaching is an art form which transforms a subject into a colorful array of interesting inquiries. It is not so much that we really *teach*, but that we create an environment (social, physical, and emotional) conducive towards students experiencing learning on their own terms.

Education is exploration and learning is a continuous journey. One may make occasional stops at select *destinations* along the way, but hopefully will be inspired to proceed along yet another new and undiscovered path. *Destinations* may be thought of as various levels of learning or perhaps topics of study. Teaching is the process that may inspire one to keep on moving along the path of the unknown with confidence and persistence. When one thinks of a journey, one is often excited about the discovery process it entails; learning must include discovery, some elements of surprise and wonder.

Teaching is about helping students (independent of the teacher) set out on a quest for knowledge and understanding of the world. Teaching is finding or creating the tools to assist the journeyman on his/her educational adventure, and to inspire courage and truthful discovery in the pursuit itself. In essence, we all carry the capability to learn; ultimately, teaching unlocks the barriers that may inhibit the process.

On Teaching Literature and Acting

MANNY FERNÁNDEZ

Graduate Teaching Assistant, Department of Comparative Literature

If I were stopped on my way up the mall to Pattee by an irate ex-student who point blank demanded that I share with him or her my teaching philosophy, the philosophy responsible for the decisions I made as a teacher, I would have to throw myself at the mercy of my inquisitor by confessing an absolute lack of philosophical unity behind the fractious pedagogical methods which I have employed.

The problem may have something to do with what I teach, literature. No, wait. Literature may be too constricting a word: can we really refer to Native American myths as literature, since what we have of them in written form are transcriptions of oral storytelling? Then again, we've used the word literature for Homer's epics . . . are these epics, themselves products of oral storytelling, literature? Does it matter what we call them, as long as we can enjoy them?

Enjoy them? Aside from the apathy any eighteen-year-old might feel towards anything which isn't completely contemporaneous, can one really enjoy anything that raises the specter of the most fundamental issues that can be discussed within the literary discipline, the notion of literature itself, and of our ability to read it, translate it into our experience, understand it without limiting it?

As a teacher in Penn State's Comparative Literature department, I have found that these fundamental issues worm their way into my attempts to present myself as a confident conveyor of information. The hopes that my students will walk away feeling as if they have gained something from my class which will enrich their lives in future

years are constantly undermined by the fact that the inclusive nature of my discipline rejects the standard narrative sequences which we are used to. There is no book of progress here, no columns of successes and failures, no "Gee, that didn't work back in 1789, guess we'll try something else now" simplicities.

There is a profound feeling that one can barely begin, that before beginning one must first know, but that beginning to know is impossible unless one first pretends to know. But can such an act . . . teach?

I must, in order to teach, believe that, yes, a pretense teaches. Pre-tense. That's how I feel prior to teaching, pre(tty) tense. It gets very lonely out there when you don't even trust the most basic aspects of your information. Consequently, I have begun to lean more on dramatic abilities than information to foster discussions, to encourage participation, to present literature—of whatever kind or origin—as an act in process. And I'm pretty tense about where this may lead. I'm aware it doesn't lend itself easily to the much expected "What have we learned today?" type of encapsulations. I consider students' demands for those encapsulations understandable, however, given their need to fulfill certain requirements which will determine whether or not they graduate, begin their career, and ultimately fulfill their expectations of themselves.

So does one teach them lies consciously in order to allow them to live? What manner of being can speak lies consciously and yet remain untouched by them, remain honest?

Only an actor (Plato would agree). An actor masquerading as a teacher, or a teacher masquerading as an actor: is there a difference? The authority inherent in one role becomes the pretense of the role in the other. Performance becomes knowledge.

The key, perhaps, is that the so-called act that the teacher performs is not an act. There can be no trace of the actor's disdain for the audience's ignorance of the plot twists to come: both teacher and pupil must traverse the road of the text as one, each discovering the other through the common bond which is the story. What is outside of them should be revered as a site of discovery.

Perhaps my hypothetical irate ex-student would understand my attempt at historicizing the very moment of our communication, at creating a space in which knowledge is itself open and both of us participate in the chaos of creation. Perhaps this philosophy, which is not a philosophy, may one day be reducible to standard testing and grading procedures. At that point, I know I'll have lost, and must begin again.

Teaching Philosophy

RAMANI S. PILLA

Pre-Doctoral Lecturer, Department of Statistics

Being prepared is central to good teaching. My goal as a teacher is to help students (1) learn to think in terms of the subject matter by stimulating participation and giving practice in thinking and (2) formulate applications of principles. I believe that teaching is a process of (1) helping students learn new techniques or skills and (2) improving their analytical thinking skills so that they can use statistics effectively in their own field. In general, teaching consists of three main steps: motivation, interaction, and evaluation.

Motivation: In an abstract subject like statistics, getting students motivated can be very challenging. Clarity of presentation plays a crucial role in keeping students motivated and helping them understand difficult and abstract concepts. I start with an introductory lecture to establish a foundation for different concepts. At the beginning of every class, I briefly review the previous class material, outline the lecture, and finally start the lecture with a question to gain

their attention. In general, I use real-life examples to introduce a new concept and then give formal definitions or required formulae. This will help them relate to the concept better. For example in illustrating the applications of statistics, I consider the Salk polio vaccine. In 1954, vaccine trials were performed in some 400,000 children, with strict controls to eliminate biased results. Good statistical analysis of the results firmly established the vaccine's effectiveness and helped eliminate polio.

Interaction: Especially in a large class, students feel intimidated to ask questions, and it is a real challenge for the teacher to encourage student participation. I have been successful in making students feel at ease by asking simple questions at first and then repeatedly encouraging them to ask questions. Once in a while I stop lecturing and just ask simple questions addressing one or two students. Although at first they do not respond, I found this method to be very successful in my lectures. Enthusiasm of the teacher is an important factor in affecting student learning, interaction, and motivation. Not only is the teacher a model in terms of curiosity and motivation, the teacher also models ways of approaching problems. I believe that the following methods also work very well in facilitating interaction:

- *Eye Contact:* I avoid speaking or looking to the board or to one particular point in the class. Instead, I look at every direction from time to time and pause once in a while to allow students to ask questions. Making eye contact helps them feel very comfortable and unafraid to ask questions.
- *Humor:* While teaching, I make some jokes related to the subject to ease the tense atmosphere. For example, when I teach *Normal distribution*, I use an example: A student's weight is the result of genetics, nutrition, illness, and last night's beer party. When you put them all together, you get the normal!
- *Modern Teaching Aids:* I use some of the new teaching aids, like over head projectors, computers, and VCRs. For example, when I introduce the difficult concepts of probability and random variable I use pre-recorded cassette clippings that illustrate the concepts clearly with a coin or a die. Graphs, real-life examples, large data sets, or tables can be shown using an overhead projector. Computers could be used to make inferences and to summarize the data. To free students from excessive note-taking in the introductory courses, I prepare handouts of definitions, some important formulae, and problems that will be solved in the class. I also include more example problems for practice and to reinforce tough concepts.

Evaluation: Evaluation is a great deal more than giving a grade. It is important to distinguish average students from above average and excellent. A major part of my evaluation is in the form of comments on papers, responses to students' statements, conversations, and other means of helping students know where they are and how to do better. I believe that grades should be assigned based on the degree of competence achieved and not on the basis of the quantity of work done. Whatever the test procedure is, it should consist of some "challenging" questions that make the students think creatively and critically. After grading the students' assignments or exams, I spend a little class time on discussing the common problems/mistakes made by the class. This will help students do better next time.

My Evolving Teaching Philosophy

CYNTHIA DECKER RAYNAK

Instructional Designer, Center for Learning and Academic Technology

To me, teaching is creating a safe environment that encourages learning. I teach basic skills in Computer Science, and many of my students are returning adults. One of my course goals is for the students to become independent of which button to push or which icon to click. I would like them to acquire an understanding of the "process" of the technologies

we study. In order to reach this goal, the student must clearly understand the objectives of an exercise and be able to devise which process(es) will enable them to reach the objective. That there is usually more than one process or solution to most technology-based tasks and problems, provides a wonderful opportunity for the student to be creative in his or her critical thinking process and problem-solving. Developing projects that leverage this "one problem to many solutions" scenario is a challenge.

When encountering a new, and sometimes threatening, subject most students experience some anxiety. Returning adults are especially prone to this anxiety since they are struggling with many additional life issues that the traditional student is not experiencing; not the least of these issues is the feeling that the world is passing them by at a furious rate. These anxieties seem particularly pronounced when the subject matter is technology. Many students, especially non-traditional students, approach learning technology-based skills the same way that they have been conditioned to approach more traditional subjects. These courses are usually taught in the traditional lecture, memorization, and exam format. Given the freedom to approach class projects using the learning style of their choice (e.g., group or individual work, choice of subject matter, choice of tools), students are initially bewildered. To many students this approach seems very risky. They are unwilling, or even afraid, to make mistakes and perhaps fail in their first few attempts at solving a problem. Thus, it is important to create a sense of security in the classroom so that a student is willing to take the risks needed to explore different solutions freely.

In order to create this environment and structure it in a way that engages the student in his or her own learning, an instructor must have a clear path. For each class I develop a set of objectives and goals that the student must strive to reach. Consequently, a student who clearly understands the objectives of an exercise, is more likely to take risks and try new tools and processes in order to accomplish the objective. In the area of technology, it is far more important to understand the process rather than simply replicate the steps to complete an exercise. This means changing assignment requirements from simply producing a product, to creating a product and defining and explaining the logic of the process. Why did the student choose a particular method or tool; were there other methods; why were the discarded methods and tools not chosen instead? Gaining an understanding of the problem-solving procedure is crucial. The student is then better able to transfer this knowledge from the closed world of a computer lab to a world of technology that is evolving at an ever increasing rate.

Communication is the major tool required to create a safe environment. I attempt to establish an ongoing open-ended dialog with the class from the very first day. I encourage my students to ask lots of questions: in class, through e-mail, or by phone. By offering students several options, I get questions from those students with "performance anxiety," who hesitate to speak in a public forum. This means that all students, regardless of personal interaction style, have some pathway through which they can have their questions addressed. However, there is another, albeit unexpected, method of communication. This method is "communication by example", usually when the technology fails. By overcoming unexpected technology "problems" the instructor demonstrates, better than any lecture, that one can recover from seemingly devastating problems if there is a basic understanding of the process.

By carefully constructing all of these lines of communication, and by keeping them free-flowing, I attempt to build the best environment I can to encourage learning. That is the most that I can offer. I cannot in effect make a student learn, or even want to learn. I try to provide the opportunities, the rest is all up to the student.

Teaching Philosophy

SHARI ROBERTS

Assistant Professor, Media Studies

Providing a Good Environment for Learning: Good educators must be active learners in order to model for students an inquisitive mind at work on intellectual tasks. I join together teaching, learning, and research in the classroom, with students participating as collaborators in our joint quest for knowledge. My teaching methods are often inspired by the incorporation of my research interests into the classroom. At the same time, my scholarship is continually enhanced by drawing on my classes' atmosphere of growth and fresh perspectives that the questioning of my students offers my scholarly interests. (*Exhibit A*: Representative Comm 411 e-mail exchange between student and professor.) My foremost goals as a teacher are to help students learn how to learn and to foster in them a life-long desire for learning.

Encouraging Critical Thinking: My primary goals as a teacher are to help students to acquire the critical tools they need to learn and to foster their interests to learn more. I strive to make materials and concerns relevant to students in order to turn their focus away from grades and toward learning. I hope that each class I teach serves as the opening of a door that leads, not down one pre-determined path of lectures, fill-in-the-blank exams, and recitations, but outward onto an open field in which the student can continue to learn—to explore and grow in the direction that best suits her interests and needs. (*Exhibit B*: Final graduate paper that refutes main claims of two theorists assigned as reading, Comm 550.)

Moving Between Theory and Practice: I offer two examples of my teaching philosophy in action in the classroom:

1) In Comm 250, Film History and Theory class, I watch with students Frank Capra's *Prelude to War* (1941) from the Office of War Information series "Why We Fight." In this U.S. World War II propaganda film, Capra uses "found" footage from Leni Riefenstahl's *Triumph of the Will* (1935). We discuss how Capra alters this footage of the 1934 Nazi Party rallies in Nuremberg, shot by a Nazi propagandist, for Allied Forces purposes. On the one hand, this exercise raises issues of realism for students: Is the Riefenstahl film a transparent window onto an historical event? Do we recognize that a documentary, or that any filmed footage, is always already biased and never transparent? In what ways is the Riefenstahl clearly pro-Nazi propaganda? On the other hand, the exercise provides for students a chance to participate in formal and critical cultural reading as they recognize on their own how, through the use of the soundtrack, voice over, animation, editing, manipulation of speed, etc., Capra uses the Nazi propaganda for a conflicting purpose. Finally, we conclude the class by comparing these filmed "documentaries" with contrasting coverages of a recent news event from different television stations—for instance, the announcement of the verdict for the O.J. Simpson civil case—allowing students to realize the relevance of such analysis to our current world views.

2) In Comm 411, Cultural Aspects of the Mass Media class, in my introductory talk I use Army Barbie, a Mattel product from during the Gulf War, as a tool to demonstrate and to promote discussion about the usefulness and necessity of critically analyzing popular culture. Students follow their own line of questioning to ask the larger question: What can studying pop-cultural artifacts tell us about our society? Students pass the doll around the room, investigating and discussing "her." They volunteer that this Barbie is symptomatic of our more progressive society, in contrast with the original Barbie, because she seems less traditionally "feminine"—she is dressed as a soldier and the packaging suggests she will go to war. However, they also discover that she is a nurse, not an infantry person, and her accessories include a hairbrush, not a

> gun, keeping in line with traditional feminine, nurturing stereotypes. Students also recognize that the Barbie Desert Storm marketing tie-up is patriotic and supportive of government involvement in the war, and also that it exploits the war and jingoistic sympathies. By examining the doll, students realize that Barbie registers sexist, nationalistic, and historically specific social constructs. Through this reading of a specific cultural text which seems, at first, trivial, they also are able to realize on their own the importance of critical analysis of popular culture "texts."

What do these two seemingly disparate educational exercises have in common? Both are opportunities to prepare students for the broad, critical thinking necessary for their jobs in industry or academics, for their roles in our society as critically aware consumers, and for their future of responsible citizenship. Critical thinking, cultural awareness, and challenging education are necessary skills, and I endeavor to tutor students towards a critical literacy that can, ultimately, empower them.

Making Classroom Experience Relevant to Students: Incorporated into my classes are different strategies to encourage student understanding of the relevance of the theoretical materials and classroom work to their personal lives. (*Exhibit C*: Student Journal, Comm 411; *Exhibit D*: Resumes for guest speakers for Comm 411, including African American television and Broadway actor John Amos and *Philadelphia Inquirer* editor Charles Fancher; *Exhibit E*: One of five "Thought Project" assignments, Comm 411; *Exhibit F*: Exemplary Reaction Paper, presented to class daily by randomly chosen students, Comm 411.)

Encouraging Collaborative Work: Student learning is challenged if assignments encourage not only individual effort but also collaborative projects. (*Exhibit G*: Written outline for group presentation of formal film analysis, Comm 250.)

Fostering Students for Different Learning Levels and Personalities: The courses I teach fulfill requirements for seven different majors, and students may range from sophomores to seniors, and from bold to shy. I use different strategies to reach individuals within the context of 50-student classes, including requiring students to e-mail at least one thoughtful question per topic section (*Exhibit A*), and having students fill out structured post-exam questionnaires for the initial exams (*Exhibit H*). In addition, I lead students through a "building block" structure for learning in Comm 250, in which they must master the art of formal analysis and writing a college-level paper. Each of the following assignments leads them directly forward to the next one, each building upon the previous assignment in terms of skill and knowledge: Students first orally present an analysis (*Exhibit G)*, then write an abstract (*Exhibit I*) for their first paper (*Exhibit J*),which they are allowed to revise and expand for their final paper (*Exhibit J*).

Intellectually Challenge Students—With Needed Structure: In order to challenge undergraduate students intellectually, assigned readings include influential, and often difficult, theorists in the original, for instance, Marx, Althusser, Williams, Bazin, Barthes, and Eisenstein. Such reading assignments also work to demystify theorists and empower students through mastery. However, so that students can reach comprehension and engagement on their own—instead of confusion and frustration—I give them study guides weekly to which they can refer as they read (*Exhibit K*).

Fair Means of Assessment: A variety of assessment methods are used in order better to evaluate different types of student learning. For instance, it is crucial for students to learn important theoretical points from readings and screenings (*Exhibit L*: Comm 411 exam #2), as well as basic terminology (*Exhibit M*: Comm 250 exam #1), so I use multiple choice exams, in which questions act as analytic puzzles, not memorization quizzes, as well as more critical thinking, which is better assessed through essay questions or papers (*Exhibit L*; *Exhibits G-J*). Assessment: (*Exhibit L*: Midterm Evaluation and results).

Statement of Teaching Philosophy

UMEETA SADARANGANI

Pre-Doctoral Lecturer, Department of English

I view the classroom in which I teach as a student-centered space. What do I mean by this when in each case I design the course and set the assignments? My view of the classroom is influenced by my perception of the roles of my students and of my role as teacher. I see my students as individuals who are entering discourse communities—whether they be communities of writers, of literary critics, or of readers of fiction—and myself as someone who has some experience with such communities and has tools that can help my students thrive in such communities. However, I do not simply provide my students with tools that can help them succeed; I also encourage them to become aware of their roles in the discourse communities in which they participate. I show them how active and critical participation can empower them to influence discourses.

For instance, in my writing classes, I ask students to analyze advertisements to provide insight into an aspect of our culture. This assignment not only requires students to become familiar with the conventions of academic writing, specifically critical analysis of texts, but it also urges them to analyze their own roles as readers and as consumers. Students have to choose the ads, choose an audience to write to, and argue a thesis that will provide new insight. In another assignment, I ask students to write letters either to editors or to legislators and to share their publications and their responses with the class. For most students, this is the first time they are writing—and being published—in such rhetorical contexts. Such assignments, which encourage critical analysis of familiar discourses, have worked well in writing classes with basic writers as well as with honors students. I find that such assignments encourage an openness to new ideas and also develop critical thinking skills.

At the beginning of each term, I remind students that they are as responsible for the success of the class as I am. What they bring to the class—their concerns, their knowledge, their attitudes towards learning and towards each other—all influence what happens in the classroom. I encourage dialogue between my students and me and among the students themselves. This dialogue includes asking them to respond to each other's papers and to my comments on papers. I also aim for a classroom climate where students feel free to try out new ideas. I believe students do well when they feel they can contribute, when they find what they are studying to be relevant to them, and when they can take risks without worrying about simply a "right answer." I find that often when my students take risks, I learn and grow as a teacher.

I also ask students to meet with me one-on-one to discuss their work. These meetings allow me to better understand students' interests and backgrounds, thus allowing me to better help them as they plan projects. While I ask them to choose the specific topics they will write about, I make it clear to them that I am available to guide them and to serve as someone off of whom they can bounce ideas. These meetings also allow students to see me as someone who can help them become familiar with the broader challenges of succeeding in academia, applying to graduate schools, or searching for jobs.

When my students begin to feel at home in the academic discourse community, when they apply critical thinking skills to discourses familiar to them, and when they see learning as continuing outside the classroom and throughout their lives, then I feel I have succeeded as a teacher.

The ABC's of Our Teaching Philosophy

SOMA SANYAL AND TAMISRA H. SANYAL

Departments of Biology and Computer Science, Penn State Altoona College

A Advise and guide your students

B Build on prior knowledge

C Cheerfully communicate with students; be a conscientious teacher

D Be determined in teaching with discipline

E Educate with encouragement

F Be fair

G Be good and gracious

H Be humorous and helpful

I Improve your teaching through innovation

J Justice

K Seek the kernel of truth in everything

L Don't take teaching as a load and love your profession

M Maintain a standard and motivate your students

N Notify students of any change in the syllabus or the course

O Be optimistic and open minded

P Patiently participate in discussion in class

Q Be aware of the quality of your teaching; always ask and answer questions

R Do research to improve your teaching and respect the views of students and fellow members

S Keep self esteem and share your ideas with students

T Teach properly and sincerely

U Update your teaching material and method

V Give value to the students' opinion

W Why, what, when and how

X Explain the difficult part thoroughly

Y Be young in your mind

Z Zoom out, take a larger view; zoom in, add depth and rigor

Teaching Philosophy

LARRY SCHARDT

Instructor, Department of Agronomy

My philosophy on teaching and all of life is one and the same: make the world a better place by making myself a better person. This spreads over into teaching in that I try to pass this philosophy on to my students. There is a balance between the two major components of teaching: emotional and technical. A sort of yin and yang approach to education. Both are important and essential.

Emotional

The emotional side of teaching starts with constant self-development on the part of the teacher. It involves continuous and never-ending improvement. This is the same philosophy as the Continuous Quality Improvement movement that is sweeping across America. The student is my customer. If there is something that the student does not understand, I must be able to help him or her. Additionally, I must be on the lookout for signs that there may be problems in those students who may not ask questions. To take this further I must constantly be searching for ways to better serve the needs of the student.

Teaching is itself learning. I must seek constant interaction between my students and myself. I continuously look for signs of understanding in my students. At the beginning of the semester, I seek input into learning expectations and continue to seek input throughout the semester. I use daily feedback as a constant appraisal process and an opportunity to respond to unanswered questions.

The next important emotional component is compassion. I must seek to understand my students. My heart must be with them. They are not only dealing with the bureaucracy of the University, they have the very real emotions inherent with growing up. While it may not be possible to know what each individual is dealing with, I must be aware of the realities of emotional states.

As part of my compassion, I must seek to empower my students. This philosophy has grown inside of me since I first began dealing with students. In the beginning I was very naive and thought that every student deserved an A. However, as I learn more about human nature, I realize that this is not empowering my students. In learning as in real life, you get out what you put in. I must ingrain responsibility into each individual. This is somewhat similar to the difficult role of a parent in dealing with hard love. I now feel that I must approach teaching situations with the attitude that everyone starts out with a *chance* for an A.

Another essential emotional component is excitement. I commit to making learning exciting for my students. This teaches them a valuable lesson in life as well. I enjoy my students and my subject matter. I approach both with enthusiasm and excitement. If you love your subject you can shine through.

I learned valuable lessons from two excellent teachers I had as an undergraduate. The first was Dr. Shamma, who taught organic chemistry, of all things. I spent my first few years in college dreading the thought of having to take Chem. 34, Organic Chemistry. I had heard all of the horror stories and thought I would have a difficult time just staying awake listening to the dry material. However, to my surprise and delight, I was blessed to have Dr. Shamma. He approached the subject and his students with so much enthusiasm that it was contagious. I actually started off loving organic chemistry and enjoyed studying this fascinating subject. Thanks to Dr. Shamma, I learned a tremendous amount and enjoyed the hard work I put in to get an A.

The second, outstanding teacher I encountered was Dr. Pennock, in the soils department. His love for his subject and his students was forever evident. He always had an answer, a cup of coffee, and a cookie for each questioning student. He even went as far as to take photos of all of his students so that after years of absence, if he got an inquiry about us he would be able to put a face with a name. What a fantastic person!

I would like to make one final point about the excitement of teaching. I believe that a teacher must realize that he or she is an entertainer and that skills to sharpen this ability need to be continually honed. Material must be presented in an interesting manner or even the most exciting material can be made boring. A sense of humor is essential. Too bad so many professors take themselves so seriously. I believe that you should take the material seriously, but take yourself lightly.

Technical

The first element in the technical arena is subject knowledge. As a teacher I must know my material inside and out. Continuous study is a necessity. Experience in the subject matter is critical. Book knowledge is not the same as real world experience. I am fortunate to have worked in the field of professional natural resources conservation before I ever taught the subject. I feel that field knowledge is a very real and necessary part of teaching.

No less important than knowledge is the method of presentation. I wrote a lot about the emotional side of this in the earlier section. Building on the emotional aspect is the thought and time put into planning and organizing material. Overall class outlines and individual lesson plans increase professionalism. If there is no coherent flow, all of the best material might as well be scattered into the wind. Thorough planning is essential.

Continuous development of myself as a teacher is an ongoing process. I will continue to strive to be the best teacher and the best person that I can be. Rock'n'Roll!!!!!

One Writer's Philosophy About Writing and Supervising Student Interns

EILEEN ZUBER

Writing Internship Supervisor, Notheast Regional Center for Rural Development

I am a writer, one of many individuals obsessed with arranging words on a page, obsessed with *creating* and *evoking meaning* in life. I was not born a writer, although I do believe my life experiences have contributed to whom I have become and how I choose to express myself. Writing is many things to many people. Some curse it as a source of distress, an activity to avoid at all costs. Others see it purely as a means to an end, an activity that needs to occur before one can publish an article, communicate information. I value writing for its *relational qualities* and think of it as a complex living organism, defined, if at all, by its vast network of interrelationship—the relationship between writer and subject, between a writer's inner voice and outer voice, between writer and audience, and writer and critic, to name a few; thus, my philosophy of teaching student interns how to write in the workplace is grounded by acknowledging *relational qualities*.

One of my greatest challenges as a supervisor of student interns is teaching them the importance of understanding and valuing their employer and co-workers, and understanding the history and dynamics of an organization. I help students determine how they fit into the organizational context, so they will realize that part of their success in any company will be determined not only by their ability to write well but also by their ability to assess *relationships* (to use writer's lingo, *history, setting, atmosphere,* and *characters* matter). At the Northeast Center, this means understanding the nature of the land-grant university system and the function of research and extension activities.

What else contributes to my philosophy? Just about everything I have learned from my teachers: understanding that *writers aren't born but develop through sheer determination and hard work, through avid and wide reading, and by becoming practicing observers and listeners*. These are activities that I encourage my student interns to practice.

What I enjoy most about being a writing internship supervisor is helping students develop as writers, helping them hone their skills, teaching them how to be objective about their own writing, showing them the strengths and weaknesses in their manuscripts, encouraging them to value the revision process, and rejoicing with them when they produce a fine, publishable article.

Atmosphere, character, coherence, concreteness, conflict, detail, language, mechanics, message, presentation, setting, story line, style, tension, tone, voice—with so much to think about it's a wonder anyone writes at all. As a supervisor of student interns, I'm challenged to help students trust the writing process, to help students become confident in their ability to write in the workplace, so that when they graduate and secure a position in the workforce, they will feel confident they will succeed. If I can do that, then I will be satisfied I have done my job well.

Appendix F: Directory of Resources at Penn State

Throughout this handbook, we have encouraged you to take advantage of the various support services available at Penn State. In order to help you locate both the resources that will best serve your needs and those to which you can refer students, the following directory includes descriptions of several of these programs.

Affirmative Action Office/Diversity Support and Education Center 863-0471

The Affirmative Action Office offers assistance with managing diverse classrooms and workplaces and educational programs on all aspects of diversity through the Diversity Support and Education Center. Concerns regarding possible discrimination based on age, ancestry, color, disability or handicap, national origin, race, religious creed, sex, including sexual harassment, sexual orientation or veteran status may be discussed with staff in this office.

Assistance and Information Center 863-2020

The Assistance and Information Center provides general information to the University community. The Center also operates a 24-hour family emergency line which may be utilized by students and their families. A family/student emergency involves a situation in which a student becomes seriously ill and must miss classes for more than one day or the serious illness or death of an immediate family member. A large part of the Center's missions are carried out by Student Counselors. The Student Counselors provide emergency assistance and also present various workshops to students and faculty ranging from study skills, to eating disorders, to homesickness.

Audio-Visual Services (AVS) 865-6314

AVS provides more than 16,500 films and video programs and equipment for in-class use by Penn State faculty. Trained operators are available as well as consultation services by personnel who keep abreast of new films and videos produced for use in education.

Career Development and Placement 865-2377

Career Development and Placement offers a wide range of career/life-planning assistance for all students and alumni by providing assistance with occupational information, career choice, direction, placement, and information on co-op, internship, special summer programs, and other experiential learning opportunities.

Center for Academic Computing (CAC) 863-2494

The Center for Academic Computing is the principal service unit responsible for academic computing. Among CAC's services are:

Computing Teaching Lab 865-0800

Several labs are available by reservation to faculty and staff for hands-on instruction and a number of technology classrooms are also available for teaching purposes.

Education Technology Services (ETS) 863-1654

ETS offers specialized workshops and seminars for faculty, TAs and staff addressing pedagogical strategies for incorporating technology in the classroom and workplace. ETS has created the Web Instructional Services Headquarters web site at http://projects.cac.psu.edu/WISH. Faculty can use the WISH site to download class lists (in a format suitable for reading into a spreadsheet if you wish) set up a classnews group or an electronic maillist (through listserv), submit your library reserve list electronically, create a course web site, and more.

Faculty Multimedia Center 863-7051

Provided as a service of Educational Technology Services, the Faculty Multimedia Center is a place for Penn State faculty and their staff to receive help integrating technology into the learning process

Technology Classroom Project 863-1522

The Technology Classroom Project at Penn State is designed to give instructors and students an opportunity to interact, through the use of technology with access to models and tools not otherwise available to educators in a traditional classroom setting.

Center for Adult Learner Services 863-3887

The center helps prospective and enrolled adult learners in three ways. Adults interested in beginning or resuming college study can obtain admission and financial aid materials and educational information. Enrolled adults are helped to make the transition to student status by using the center's lounge, study area, and kitchenette; attending orientation, computer, stress management, and other programs; and meeting with staff. Lastly, staff advocate for and with adult learners to improve the University climate for adults.

Center for Counseling and Psychological Services (CAPS) 863-0395

CAPS, located in 221 Ritenour, provides group and individual counseling, crisis intervention, and psychological and psychiatric evaluations for undergraduate and graduate students, as well as prevention and consultation services for the entire University community.

Center for Excellence in Learning and Teaching (CELT) 863-2599

The Center for Excellence in Learning and Teaching acts as a neutral catalyst for improving learning and teaching by providing programs, services, and information to faculty, instructors, and teaching assistants throughout the Penn State system. These services include: (1) publications on teaching and learning, including a handbook, *The Penn State Teacher*; (2) courses, including a 10-week Course in College Teaching; (3) workshops, seminars and conversations, including a New Instructor Orientation and an ongoing program for teachers of large classes; (4) midsemester feedback activities and resources; (5) consultations, both with individual teachers and with departments, colleges, and campuses; (6) on-line resources, a Virtual Center on the WWW; (7) funding opportunities for improving undergraduate education and teaching awards and (8) mentoring and support. CELT's goals are to help inform and structure conversations about teaching at every level (department/college/campus) throughout the Penn State system, increase awareness that teaching can be learned, provide resources to improve the culture for teaching and learning at Penn State, enhance knowledge and understanding of the teaching-learning process, and promote interdisciplinary conversations among teachers as well as among teachers and students.

Center for Learning and Academic Technologies (C-LAT) 863-5512

The Center for Learning and Academic Technologies (C-LAT) of the Commonwealth Educational System provides support for transforming the teaching-learning environment throughout the CES into one characterized by learner-centered active and collaborative instruction.

Center for Women Students 863-2027

The center provides educational programming, counseling services, informational materials, and referrals on numerous women's issues, including "chilly" classroom/campus climate, institutionalized sexism, sex-based discrimination, gender harassment, and violence against women. The CWS is also involved in women's advocacy and related efforts to make the academic community aware of, and responsive to, women students' concerns. As part of its services, the center maintains an extensive library of reading materials pertaining to women's topics and numerous audio-visual holdings, which may be reserved for classroom use.

Comprehensive Studies Program (CSP) 863-1022

CSP is designed to develop the basic academic skills of students who enter the University through the Educational Opportunity Program. CSP consists of developmental coursework in English, mathematics, reading, and listening/study skills. In addition to formal instruction, students in the Comprehensive Studies Program receive specialized tutorial support, closer faculty advising, and intensive, individual counseling. The main objective of CSP is to help students gain the competence and confidence needed to cope successfully with the academic rigors of college life.

Continuing and Distance Education 865-3443

Penn State Continuing Education (C&DE) applies the resources of Penn State to business, academic, and professional clients as well as adult learners through courses, seminars, workshops, conferences, and services all designed to help adult learners stay competitive, learn new skills, share the latest research, and keep up with the latest technologies.

Independent Learning 865-5403

Independent Learning serves over 30,000 students each year and provides the opportunity for individuals to participate in organized learning wherever they may live and at a time of the student's choice.

Division of Undergraduate Studies (DUS) 865-7576

DUS provides an enrollment and advising option for Penn State students. Should students express concern about their majors or have academic difficulties that suggest a change in major may be needed, DUS may be an appropriate referral. In addition, there are DUS programs coordinators in each college who provide consultation to faculty and students on academic advising issues. These DUS programs coordinators may also be a first point of referral for you if you have academic concerns about a particular student.

Graduate Student Association (GSA) 865-4211

The mission of the Graduate Student Association is to represent and support the interests of the University's graduate student community by supporting scholarly activities and providing leadership, service, and social opportunities.

Judicial Affairs 863-0342

Judicial Affairs handles disciplinary actions against graduate and undergraduate students, based on complaints from faculty, students, staff, or community, when there is a violation of the code of conduct (for example, academic dishonesty, classroom disturbances, or any other action against a member of the university community by a student).

The Leonhard Center 865-4020

The Leonhard Center's mission is to improve the quality and relevancy of the undergraduate student experience by emphasizing design as an integrating force in the engineering curricula, promoting active learning, and developing communication and leadership as essential engineering skills.

Office of the Vice Provost for Educational Equity (OVPEE) 865-5906

The Office of the Vice Provost for Educational Equity offers resources for faculty on a variety of subjects dealing with diversity in the classroom, including videotapes that depict several scenarios dealing with diversity issues. Each video comes with a discussion guide or may be facilitated by staff from OVPEE. The following units within OVPEE provide additional support to faculty and students.

Commission on Lesbian, Gay & Bisexual Equity (CLGBE) 863-7696

The CLGBE offers several resources, including monthly discussions on lesbian, gay, bisexual, and transgendered topics; research forums for the presentation and discussion of lesbian, gay, and bisexual research by Penn State faculty; peer education classes for the Penn State community; and a lecture series featuring speakers actively involved in LGBT issues.

International Teaching Assistants Support Group 863-7889

The Support Group's objectives are to (1) welcome new ITAs; assist them in adjusting and thriving at Penn State through discussions and networking resources; (2) provide a forum for exchange of ideas to help ensure a positive classroom experience on the first day of the semester and beyond; (3) highlight the contribution of ITAs in university education; (4) work to dispel any myths surrounding foreign nationals through structured discussions between students, ITAs, and faculty; (5) foster a mentor program between senior ITAs and freshman ITAs; and, (6) provide an opportunity for ITAs to receive feedback from their peers.

Multicultural Resource Center (MRC) 865-1773

The Multicultural Resource Center (MRC) in 122 Grange provides professional counseling and educational services for African/Black American, Latino/Hispanic American, Asian and Pacific American, and American Indian/Alaskan Native undergraduate students. Its staff is dedicated to helping students succeed and graduate from Penn State.

Office for Disability Services (ODS) 863-1807 (voice or TTY)

Faculty can contact ODS for assistance in teaching or testing students with disabilities. ODS will provide sign language interpreters or notetakers for deaf students. Lab assistants can be provided for students who physically have difficulty manipulating laboratory equipment. Test accommodations can be arranged, such as test proctors or readers for extended time exams. Contact ODS if you have any questions about these or other services that students with disabilities may require in the classroom.

Office of Veterans Programs 863-0465

The Office of Veterans Programs is organized as a comprehensive, direct service unit for veterans and VA benefit recipients. Four full-time professionals, a staff assistant, and approximately 20 student veterans who work part-time under the provisions of VA work-study provide programming and services in three major areas: outreach, certification and enrollment monitoring, and general counseling.

Women in the Sciences and Engineering (WISE) Institute 865-3342

The Women in the Sciences and Engineering Institute represents an innovative approach to cross-disciplinary interaction among engineers, humanists, scientists, and social scientists to address the underrepresentation of women in the sciences and engineering at Penn State, national, and internationally. The Institute runs a variety of programs designed to improve the recruitment and retention of women in science and engineering fields.

Program in English as a Second Language 865-7365

This program administers two service programs for non-native speakers of English. The English for Academic Purposes Program provides courses for undergraduate and graduate international students who are pursuing degree programs at Penn State. The Intensive English Communication Program serves the needs of non-native speakers of English who are ineligible for admission to Penn State or who need improved English proficiency for other reasons.

International TA Training Program 865-7365

This program is designed to prepare international teaching assistants (ITAs) to become successful communicators in their roles as TAs at Penn State. The program administers, evaluates, and reports the scores of the oral proficiency test given to all potential ITAs. In addition, the program offers three English as a second language courses designed to meet the unique needs of ITAs at Penn State.

Schreyer Institute for Innovation in Learning (SIIL) 865-8681

The Schreyer Institute for Innovation in Learning offers funding and support for faculty to make classroom innovations, particularly those involving collaborative and/or problem-based learning.

TIPS (Telephone Information Penn State) 863-1234

Telephone Information Penn State (TIPS) offers a variety of information messages to the University community through audio (phone) and visual (Gopher) technology.

Undergraduate Student Government (USG) 863-1874

The Undergraduate Student Government (USG), the primary student governing body at the University Park campus, promotes student interests to the administration, sponsors student activities, and offers students many opportunities or leadership. The Academic Assembly is part of the legislative branch of the USG and is concerned with representing students and with handling academic complaints.

The University Learning Resource Center (ULRC) 865-1841

The ULRC helps students by providing personal academic support services and access to learning technologies. Free peer tutoring in writing, mathematics, foreign languages, and many general education courses is offered at several sites around the campus.

Tutoring Services:

Math Center (220 Boucke, 865-1841)

The Math Center offers peer tutoring in Math 1 through Math 200. Trained peer tutors assist students in understanding concepts, gaining strategies for solving problems, and preparing for exams. The range of subject matter for which help is available includes basic numerical skills, algebra, basic geometry, trigonometry, and calculus.

Writing Center (219 Boucke, 865-1841)

The Writing Center tutors offer help with a variety of writing tasks. Whether students are composing an essay, an important letter, or a research paper, peer tutors offer individual assistance at any stage of the writing process—from defining a writing task to revising a draft.

Tutoring Center (220 Boucke, 865-1841)

The Tutoring Center offers individual and group tutoring for introductory-level courses. To receive help, students should drop by 220 Boucke and talk to a learning consultant.

Supplemental Instruction (220 Boucke, 865-1841)

Supplemental Instruction (SI) provides a guided study group for students enrolled in targeted large lecture-based courses. Leaders attend the course lecture and act as group facilitators.

The Computer Learning Center (217 Boucke, 865-1841)

The Computer Learning Center is geared for the beginning computer user. Consultants provide one-on-one assistance to help students learn the basics of computer and software use.

Learning Skills Consultants (220 Boucke, 865-1841)

The Learning Consultants assist students who experience general academic difficulty. Consultants help students identify problem areas and improve academic skills.

Technology Centers:

East Halls Learning Center (15 Pinchot, 865-1325)
Health & Human Development East Learning Center (1 HHDev East, 863-4393)
Sparks Learning Center (7 Sparks, 863-4392)

The three technology centers serve as out-of-class learning locations where students can use computers, video and audio tape players, and digital video-editing equipment to complete their course work. Instructors can place course materials in the centers for their students' use, including reserved readings, video and audio tapes, and software. The ULRC can support instructors in integrating software and the use of E-mail and the World Wide Web into their courses by helping their students learn to use these materials.

University Libraries System

The University Libraries System serves users at the following locations in the Commonwealth of Pennsylvania: University Park Campus, The Commonwealth College which includes the twelve Penn State campuses, Penn State Abington; Penn State Altoona; Penn State Erie, The Behrend College; Capital College; Berks-Lehigh Valley College, and Penn State Great Valley.

Library Information Access System (LIAS)

LIAS (Library Information Access System), Penn State's computer-based library system, is the heart of the Penn State Libraries. LIAS includes The CAT—the online catalog containing the holdings of all the Penn State Libraries—as well as other databases and Internet resources. You can access LIAS three ways: from workstations in the University Libraries, over the Penn State Network (via Web or telnet to LIAS.PSU.EDU), and via Dialup (814-865-5427).

Reserve Materials 863-0323

Books and articles for a class may be placed in the Reserve Reading Room in Pattee where they may be used for an unlimited time or borrowed for two hours or overnight. Materials may also be placed on reserve in the Architecture Library, Earth and Mineral Sciences Library, Education Library, Engineering Library, Mathematics Library, and Physical Sciences Library.

University Photo/Graphics ..... Photography: 865-6507; Graphics: 865-2041)

Photo/Graphics offers a wide variety of creative services to the University, including: computer graphics/Webpage design, print design, illustration, computer animation, multimedia, signs and banners, displays, digital imaging/manipulation, photography, film processing, photographic printing, photographic copying, slide duplication, drymounting and lamination, photostats and overhead transparencies. Services are available to all faculty, staff, and students. Faculty needing help on course-related work will only be billed for materials.

University Scholars Program 863-2635

The University Scholars Program is a University-wide Honors program for academically superior students. It is designed to challenge them, to enrich and broaden their general education, and to deepen their preparation for graduate study or a profession.

University Testing Services (UTS) 863-2802

University Testing Services (UTS) offers services that assist faculty with assessment of student learning. In addition to document (answer sheet) scanning and grade book services, UTS also supports the creation and maintenance of test item databases for automated creation of multiple forms of classroom test booklets as well as the creation and administration of practice tests and associated feedback to students on computers in the Penn State computer labs. These services include a variety of reports that support the management of the classroom learning environment. They also merge item texts files with item statistical indices so that each item can be evaluated in terms of its effectiveness in the assessment of student learning.

Supplementary Reading

General

Davis, Barbara Gross. *Tools for Teaching.* San Francisco: Jossey-Bass, 1993.

This book is a handy resource that covers a wide range of relevant and practical issues, such as teaching strategies, diversity, and grading. Each chapter has a checklist of ideas for teaching, as well as a useful reference list of relevant research for those interested in further study.

McKeachie, Wilbert J. *Teaching Tips: Strategies, Research, Theory for College and University Teachers,* 9th ed. Lexington, Mass.: D.C. Heath, 1994.

One of the few comprehensive overviews of college teaching that is as practical as it is scholarly, this book can serve a broad array of purposes and users with equal facility. From the beginner's essential guide to teaching in higher education to a valuable desk reference for the experienced academic, *Teaching Tips* offers friendly advice backed up by relevant research and theory. Chapters include basic topics such as course preparation, first class meeting, organizing discussions, lecturing, testing, and grading. McKeachie also covers a variety of teaching methods and techniques from experiential and collaborative learning to teaching with cases, games, role plays, and computers. Special chapters on classroom management, student diversity, learning and cognition, ethics, motivation, appraising teaching, and classroom research round out McKeachie's survey. A widely respected cognitive psychologist with much classroom experience and a sensible grasp of the teacher's priorities, McKeachie has dutifully updated his research (adding contributions from other experts where needed) over the 40+ years that this classic has been in print.

New Directions for Teaching and Learning. San Francisco: Jossey-Bass.

This is the premier source book series dedicated to improving college teaching and student learning across disciplines. Each quarterly issue contains topically related, invited contributions. For the nonspecialist interested in keeping current with issues in higher education, this is a series well worth following. For the researcher or teacher interested in a particular topic, back issues of New Directions for Teaching and Learning should not be overlooked.

Designing a Class that Motivates Learning

Altman, Howard B., and William E. Cashin. *Writing a Syllabus.* IDEA Paper, no. 27. Manhattan, Kans.: Center for Faculty Evaluation & Development, 1992.

To the experienced teacher, probably few of the items listed in this paper are likely to come as a surprise. However, a study conducted in 1989 revealed that many "obvious" items are often omitted from professors' syllabi. At the very least, this paper will provide a useful organization of what is already known.

Planning a Class Session: A Guide for New Teachers. University Park, Pa.: Center for Excellence in Learning and Teaching, 1996.

Rather than providing a template for a lesson plan, this workbook is designed to guide teachers through the process of planning a class session. It offers a series of questions that help teachers decide what they want to accomplish, how they're going to accomplish it, and how they will determine whether or not their goals have been met.

Hammons, James O., and Jackson R. Shock. "The Course Syllabus Reexamined." *The Journal of Staff, Program, & Organization Development.* 12, no. 1 (1994): 5-17.

This article builds on Altman and Cashin's "Writing a Syllabus." It provides actual examples of different parts of a syllabus, such as objectives, rationale, and conduct statements, and elaborates further on the advantages and disadvantages of a comprehensive syllabus. A useful piece.

Ryan, Michael P., and Gretchen G. Martens. *Planning a College Course: A Guidebook for the Graduate Teaching Assistant.* Ann Arbor, Mich.: National Center for Research to Improve Post Secondary Teaching and Learning, 1989.

This handbook provides a thorough summary for planning a course, choosing goals and objectives, and writing a syllabus.

Matching Methods to Objectives

Bosworth, Kris. "Developing Collaborative Skills in College Students." In *Collaborative Learning: Underlying Processes and Effective Techniques,* edited by Kris Bosworth and Sharon J. Hamilton. New Directions for Teaching and Learning, no. 59. San Francisco: Jossey-Bass, 1994.

One of the obstacles to implementing collaborative activities is that students are accustomed to working competitively, not collaboratively. In this short article, Bosworth defines some of the collaborative skills students need to learn and suggests ways teachers can teach these skills and make them explicit.

Bransford, John D., and Barry S. Stein. "A Model for Improving Problem Solving." In *The Ideal Problem Solver*. New York: W.H. Freeman, 1984.

This chapter outlines a heuristic for teaching problem-solving skills that has proved to be a useful and flexible model for faculty and students in a wide variety of disciplines. The writing in the book is clear and straightforward—it could be used by either teachers or students. The heuristic described is well grounded in research and has inspired further research as well.

Bruffee, Kenneth A. *Collaborative Learning: Higher Education, Interdependence, and the Authority of Knowledge.* Baltimore: Johns Hopkins University Press, 1993.

This is one of the most comprehensive books available on collaborative learning. Bruffee writes for university teachers and administrators, as well as for non-academics interested in higher education. He challenges these audiences to revise their assumptions about the nature of knowledge, the nature of authority, and the teacher/student relationship. Bruffee defines collaborative learning as "a reacculturative process that helps students become members of knowledge communities whose common property is different from the common property of the knowledge communities they already belong to." He urges a shift from a foundational to a non-foundational, social constructionist understanding of knowledge, which requires a different kind of authority on the teacher's part. Bruffee argues that collaborative learning puts into place changes in our understanding of knowledge and learning that are already taking place in our society.

Cashin, William E. *Improving Lectures*. IDEA Paper, no. 14. Manhattan, Kans.: Center for Faculty Evaluation & Development, 1985.

The author notes that lecturing is appropriate for some instructional goals and very inappropriate for others. The article includes a list of strengths and weaknesses that can be used to determine the propriety of the approach, given a set of instructional goals. When lecture is deemed appropriate—and it is for many of the instructional goals of college-level classes—Cashin provides recommendations for preparation and organization, presentation and clarity, stimulation and interest, feedback, and interaction.

Cramer, Sharon Farago. "Assessing Effectiveness in the Collaborative Classroom." In *Collaborative Learning: Underlying Processes and Effective Techniques*, edited by Kris Bosworth, and Sharon J. Hamilton. New Directions for Teaching and Learning, no. 59. San Francisco: Jossey-Bass, 1994.

This article addresses one of the biggest questions teachers have about collaborative learning: how to assess it. Cramer describes many of the different options teachers have for assessing both the process and the products of group work. This article would be particularly useful to someone in the midst of designing collaborative activities.

Kasulis, Thomas P. "Questioning." In *The Art and Craft of Teaching*, edited by Margaret Morgouroth Gullette. Cambridge: Harvard-Danforth Center for Teaching and Learning, 1982.

This article puts questioning in the context of class discussion. The author asserts student questions are most often directed toward content, but the teacher's response needs to be in the larger context of process (how the class is functioning) and persons (who is involved), as well as content. The next (and we believe best) section describes how questioning can function productively in all three arenas. The author's point is that skillful use of questioning can accomplish much beyond superficial interaction with content.

Miller, Judith, John Trimbur, and John M. Wilkes. "Group Dynamics: Understanding Group Success and Failure in Collaborative Learning." In *Collaborative Learning: Underlying Processes and Effective Techniques*, edited by Kris Bosworth and Sharon J. Hamilton. New Directions for Teaching and Learning, no. 59. San Francisco: Jossey-Bass, 1994.

As the title indicates, this article looks at the issues of group dynamics in collaborative classrooms. The authors offer three models—personality and learning style, cognitive style, and group life development—for analyzing group dynamics and understanding the problems and opportunities of collaboration. They then make practical suggestions for designing assignments and facilitating group work. This article would be particularly useful for teachers using long-term collaborative projects in their classes.

Schoenfeld, Alan H. *Mathematical Thinking and Problem Solving.* Hillsdale, N.J.: Lawrence Erlbaum, 1994.

The papers in this book address a variety of topics including research projects that make calculus students think and instruction that fosters thinking and problem solving. It is an excellent resource for innovative ideas on how to connect abstract concepts to real life problems.

Smith, Karl A. "Cooperative Learning: Making "Groupwork" Work." In *Using Active Learning in College Classes: A Range of Options for Faculty*, edited by Tracey E. Sutherland and Charles C. Bonwell. New Directions for Teaching and Learning, no. 67. San Francisco: Jossey-Bass, 1996.

In only 12 pages, Smith succinctly yet thoroughly defines cooperative learning—its history, research findings, fundamental principles, ideas for implementation, and common barriers. This is a good introduction to cooperative learning for beginners, but also provides some useful context and practical ideas for the more experienced.

Tompkins, Jane. "Pedagogy of the Distressed." *College English* 52, no.6 (1990): 653–660.

Tompkins discusses "the distance between what we do as teachers and what we say we believe." She describes her own change from the "performance model" of teaching, which focuses on the teacher's ability, to a collaborative model focusing on the students. This is a thought-provoking and extremely well-written article that has become a "must read" in the literature on teaching.

Welty, William M. "Discussion Method Teaching: A Practical Guide." *To Improve the Academy* 8 (1989): 197-216

This is a good "how-to" resource on discussion. The section on preparing for discussion is particularly useful, proposing concrete activities for instructors before they begin any in-class discussion. Also considered are "ideal" physical settings for discussion (and what to do if you don't have them) and after class follow-up activities for the instructor, as well as a large section on the discussion as it transpires in class.

Teaching to Scale

Ehrmann, Stephen C. "Asking the Right Questions—What Does Research Tell Us About Technology and Higher Learning?" *Change* 27, no. 2 (1995): 20-27.

Sets out immediately to eliminate useless questions about technology and higher education—questions such as, "Do computers do a better job of helping faculty teach than traditional methods?" and "Will technology cost more or less than traditional methods?" Next, the "right" questions are addressed: Are students being taught the right stuff in the first place? Is the medium more important than the message? Can software not designed for instruction be good for learning? Ehrmann concludes that technology works best when it enables/supports large-scale changes in learning methods and resources.

Johnson, R. Neill, Diane M. Enerson, and Kathryn M. Plank. *Diversity: A Selected and Annotated Bibliography*. University Park, Pa.: Center for Excellence in Learning and Teaching, 1997.

Brings together a number of challenging and useful materials on diversity and multiculturalism in higher education. Besides being descriptive, each annotation is intended to provide the reader with a sense of the educational purpose the book or article could serve. While some sources address issues of academic diversity, others are concerned with the connection between students' approaches to learning and their socio-cultural backgrounds or identities. Most resources listed here are available at CELT. Also available from CELT are a collection of case studies on issues of diversity.

Levine, Lawrence W. *The Opening of the American Mind: Canons, Culture, and History*. Boston: Beacon Press, 1996.

Although not a teacher's guide, this book offers a useful context for current debates about canons and identity formation in American higher education. Provides a calm, concise, and well-researched response to alarmist accounts such as Allan Bloom's *The Closing of the American Mind: How Higher Education Has Failed Democracy and Impoverished the Souls of Today's Students* (1987). Levine traces a series of transformations in the American college curriculum as educational institutions have attempted to meet changing societal needs. Just as scholars lamented the demise of the classical curriculum in the late nineteenth century, many today complain that universities have abandoned the traditional canon. In short, Levine puts things nicely in perspective. Overall an informative and enjoyable read.

Svinicki, Marilla. "The Teaching Assistantship: A Preparation for Multiple Roles." In *Teaching Tips* 9th ed. edited by Wilbert J. McKeachie. Lexington, Mass.: D.C. Heath, 1994.

This chapter offers useful advice for both TAs and the faculty who supervise them.

Willits, Fern K., Jeanette O. Janota, Betty L. Moore, and Diane M. Enerson. *Penn State As a Community of Learning: A Survey Report with Supplemental Readings.* University Park, Pa.: Center for Excellence in Learning and Teaching, 1996.

How well does Penn State fit the definition of a community of learning outlined by Ernest Boyer and The Carnegie Foundation? This report summarizes the findings of two surveys that asked Penn State faculty and students about their perceptions of the campus community. It also reports on a series of conversations on the topic sponsored by the Center for Excellence in Learning and Teaching.

Measuring and Evaluating Student Learning

Ory, John C., and Katherine E. Ryan. *Tips for Improving Testing and Grading.* Newbury Park, Calif.: SAGE, 1993.

Well-written and accessible, this book is a good follow-up to McKeachie's chapters on grading and (especially) testing. Contains much of the same information (relating tests to course objectives, deciding what kinds of tests to give, and chapters on how to write objective and constructed response questions) but goes into a bit more detail on each. Also, each chapter includes structured activities to help guide your thinking as you plan and write exam questions. Full of good examples and tests that the reader takes to learn about both test taking and one's own values.

Wiggins, Grant P. *Assessing Student Performance: Exploring the Purpose and Limits of Testing*. San Francisco: Jossey-Bass, 1993.

In-depth philosophical critique of testing as it exists today in secondary and post-secondary education. Although target audiences are secondary school educators and policymakers, this book is highly relevant for college and university instructors. Wiggins argues that from first grade at least through early undergraduate years, most American students are subjected to one-shot, uniform testing that encourages the production of

superficially correct responses rather than the use of sound thinking skills and knowledge to create meaning. He advocates better assessment, not better testing, and draws helpful distinctions between testing and feedback, standards and standardization. Thoughtful analysis that would be useful to anyone interested in modifying assessment goals and practices.

Collecting Feedback to Improve Teaching and Learning

Angelo, Thomas A., and K. Patricia Cross. *Classroom Assessment Techniques: A Handbook for College Teachers*, 2nd ed. San Francisco: Jossey-Bass, 1993.

These are useful and proven techniques for the assessment of students' academic skills and intellectual development. Each technique is fully described, and suggestions for use, procedures, data analysis, and ideas for adaptations/extensions are detailed. This book is very useful for teachers at all levels of assessment expertise, from novices through the "experts." Original references for each of the techniques are provided for those interested in the research support of each assessment procedure.

Cross, K. Patricia. "In Search of Zippers." *AAHE Bulletin* 40, no. 10 (1988): 3–7.

A short article that discusses many of the central issues of teaching. Cross describes 8 gaps in teaching between (1) teaching and learning; (2) teaching and testing; (3) process of teaching and content of the subject matter; (4) curriculum and instruction; (5) assessment and the improvement of teaching; (6) educational research and practice; (7) research and teaching; and (8) intrinsic and extrinsic rewards. She also proposes some "zippers" to close these gaps, such as classroom assessment techniques.

Lowe, John. *Assessment that Promotes Learning*. University Park, Pa.: Center for Excellence in Learning and Teaching, 1994.

This article addresses the question of how instructors can tap Penn State students' interest in testing and grades to improve their learning. Lowe shares some assessment strategies for doing this: syllabus and day 1 questionnaire, analysis of performance on first exam, second exam follow-up, daily problem, in-class problem, and lab write up. (Available through the Center for Excellence in Learning and Teaching.)

Teaching to Learn

Cashin, William E. *Defining and Evaluating College Teaching* IDEA Paper, no. 21. Manhattan, Kans.: Center for Faculty Evaluation & Development, 1989.

Cashin argues for more comprehensive evaluation of teaching that considers a wider range of information from a variety of sources. Although he does not specifically discuss teaching portfolios, he establishes a useful guide for assembling one by defining seven aspects of teaching and discussing the most appropriate sources for information about each.

Davidson, Cliff I., and Susan A. Ambrose. *The New Professor's Handbook: A Guide to Teaching and Research in Engineering and Science.* Bolton, Mass.: Anker, 1994.

A well-written and well-researched guide that provides not only much practical advice for surviving in the profession but also a refreshingly even-handed treatment of the two primary tasks assigned academics. Does not, despite two-part format, separate excellence in teaching from conducting valuable research; rather, the authors frequently compare the two endeavors. For example, they draw an analogy between planning a research project and planning a course and demonstrate convincingly that fundamentals such as assessing the audience, defining scope and objectives, developing a plan to achieve objectives, and evaluating results are common to both. Although some materials here were originally developed in a civil engineering department, they are applicable across many disciplines—especially the chapters on teaching. Each chapter is divided into sections that end with a challenging and helpful exercise for the reader to consider. One of the most thorough and useful overviews of the profession available.

Hutchings, Pat. *Campus Use of the Teaching Portfolio.* Washington, D.C.: American Association for Higher Education, 1993.

Twenty-five stories about success and failure involved in using teaching portfolios. Hutchings' integrative introduction ties these "stories" together and illuminates the complicated relationship between evaluating and improving teaching.

——. "Peer Review of Teaching 'From Idea to Prototype.'" *AAHE Bulletin* 47, no. 3 (1994): 3–7.

First report on the progress of AAHE's two-year project to invent and promote strategies of collegial teaching reviews using 12 universities to pilot the project. Three lessons are reported: (1) when teaching is presented as a kind of "scholarly project," faculty are eager to talk with colleagues about it; (2) there are many strategies for peer review besides classroom observation and progress is more likely when faculty may choose from options; and (3) in order to change the departmental culture and make peer review effective, faculty need the support of administrators.

Seldin, Peter, and Associates. *Successful Use of Teaching Portfolios.* Bolton, Mass.: Anker, 1993.

Excellent resource for those interested in using or promoting the use of teaching portfolios. In addition to a succinct conceptual overview and guide to teaching portfolios, the book also contains a nice sampler of portfolios from an assortment of different disciplines.

——. *The Teaching Portfolio: A Practical Guide to Improved Performance and Promotion/Tenure Decisions*, 2nd ed. Bolton, Mass.: Anker, 1997.

In many ways, a seminal work. A good place to get started building portfolios.