TEACHING
AT ITS BEST
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Understanding Your Students and How They Learn</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Your Undergraduate Student Body Profile</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How People Learn</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How Structure Increases Learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Cognitive Development of Undergraduates</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Encouraging Cognitive Growth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teaching the Millennial Generation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Adult Learner</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inclusive Instructing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Challenge</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Outcomes-Centered Course Design</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Why Outcomes-Centered Course Design?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Writing Outcomes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Types of Learning Outcomes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Types of Cognitive Outcomes</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The Complete Syllabus</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Appropriate Syllabus Items</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Graphic Syllabus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Online “Living Syllabus”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Getting Students to Read Your Syllabus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Evolving Syllabus</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Your First Day of Class</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Before the First Class</td>
<td></td>
</tr>
<tr>
<td></td>
<td>First Impressions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exchanging Information</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Icebreakers: Getting to Know You</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subject Matter Icebreakers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drawing Class to a Close</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Motivating Your Students</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>What We Know About Motivation in Learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Credible Theories of Motivation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strategies for Motivating Students</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equity in the Classroom</td>
<td></td>
</tr>
</tbody>
</table>
CONTENTS

Part Two
MANAGING YOUR COURSES 61

6 Copyright Guidelines for Instructors 63
Where Copyright Does and Does Not Apply
Common Copyright Misconceptions
Free Use: Fair Use, Facts, and Public Domain
Printed Text
Visual Materials
In-Class Performances
Recording Broadcast Programming
Online/Electronic Materials and Distance Learning
Obtaining Permission or a License
How Copyright Violations Are Actually Handled
For Further and Future Reference

7 Preventing and Responding to Classroom Incivility 71
What Is Incivility?
Why the Increase?
Preventing Incivility: Your Classroom Persona
Responding to Incivility
Seeking Assistance

8 Preserving Academic Integrity 83
How Prevalent Is Cheating?
Who Cheats, and Why?
Detecting Cheating
Preventing Cheating
Honor Codes
Changing Student Values

9 Making the Most of Office Hours 89
Getting Students to See You
Making the Time Productive
Student-Active Tutoring
Students in Academic or Emotional Trouble

10 Course Coordination Between Faculty and Teaching Assistants 95
Before the Term: Course Review and Role Specifications
During the Term: Regular Meetings and Teaching Feedback
Extending Managing to Mentoring

Part Three
CHOOSING AND USING THE RIGHT TOOLS FOR TEACHING AND LEARNING 101

11 Matching Teaching Methods with Learning Outcomes 103
Types of Tools
Dangerous Knowledge?

12 Making the Lecture a Learning Experience 113
Purpose: To Lecture or Not to Lecture?
Preparing an Effective Lecture
Delivering an Effective Lecture
Incorporating Student-Active Breaks: The Interactive Lecture
Teaching Students to Take Good Notes
Making the Lecture Effective for Everyone

13 Leading Effective Discussions 127
When to Choose Discussion
How to Set the Stage for Discussion
How to Maximize Participation Through Skillful Discussion Management

14 Questioning Techniques for Discussion and Assessment 137
Questioning as a Process of Inquiry
Typologies of Good Discussion Questions
Poor Questions for Discussion Purposes
Turning the Tables
## Contents

### Part Four

#### MORE TOOLS: TEACHING REAL-WORLD PROBLEM SOLVING

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Inquiry-Guided Learning</td>
<td>175</td>
</tr>
<tr>
<td>19</td>
<td>The Case Method</td>
<td>181</td>
</tr>
<tr>
<td>20</td>
<td>Problem-Based Learning</td>
<td>187</td>
</tr>
<tr>
<td>21</td>
<td>Quantitative Reasoning and Problem Solving</td>
<td>193</td>
</tr>
<tr>
<td>22</td>
<td>Problem Solving in the Sciences</td>
<td>199</td>
</tr>
</tbody>
</table>

#### Experiential Learning Activities

- Student Presentation Formats
- Role Playing
- Simulations and Games
- Service-Learning: The Real Thing

#### Learning in Groups

- A Group by Any Other Name...
- The Case for Group Work
- Changing Methods, Changing Roles
- The Setup and Management of Student Groups
- Management Tips
- Tried-and-True Group Learning Strategies
- Preparing Students for Life

#### Writing-to-Learn Activities and Assignments

- Freewrites
- The One-Minute Paper
- Journals
- One-Sentence Summaries
- Learning Logs
- Dialectical Notes
- Directed Paraphrasing
- Letters, Memos, Notes, and Electronic Posts
- Mock Tests
- Drafts for Peer Feedback
- Multiple Purposes

#### Problem Solving in the Sciences

- Where Science Education Falls Short
- How to Help Students Learn Science: General Advice
- How the Lecture Can Be Made into a Meaningful Learning Experience
- How the Lab Can Be Made into a Meaningful Learning Experience
- The Essentials of Lab Safety and Management
- Why Science Education Is So Important
Part Five  
MAKING LEARNING EASIER  
209
23 Getting Students to Do the Readings  
Why Students Don’t Do the Readings  
How We Can Equip and Induce Students to Do the Readings  
Specific Tools for Holding Students Accountable  
Managing Your Workload

24 Teaching Your Students to Think and Write in Your Discipline  
Cross-Disciplinary Commonalities  
Teaching Critical Thinking Through the Discipline’s Metacognitive Model  
Metacognitive Differences Among Disciplines  
Making Students Better Thinkers and Writers  
Teaching Students to Write for Their Futures  
The Many Worlds of Writing

25 Accommodating Different Learning Styles  
Kolb’s Learning Styles Model and Experiential Learning Theory  
Fleming and Mills’s Sensory-Based Learning Style Typology  
Felder and Silverman’s Index of Learning Styles  
Parallels Across Learning Style Models  
Multisensory, Multimethod Teaching: Most Effective for All

26 Using Visuals to Teach  
Ways That Visuals Enhance Learning  
Types of Visuals for Learning  
The Future of Visuals in Teaching and Learning

27 Using Instructional Technology Wisely  
Reliable Low-Tech Tools for the Classroom  
The Choice of High-Tech Alternatives  
Learning Management Systems  
Lecture-Related Software  
Web Resources  
Laptops in the Wireless Classroom  
Web 2.0 Tools  
Looking Ahead

Part Six  
ASSESSING LEARNING OUTCOMES  
271
28 Assessing Student Learning in Progress  
Classroom Assessment Techniques  
Formative Feedback  
Student Portfolios  
Extending Classroom Assessment to Classroom Research and the Scholarship of Teaching and Learning

29 Constructing Summative Assessments  
General Testing Guidelines  
Objective Test Items  
Constructed Response Instruments: Essay Questions and Writing Assignments  
Tests and Assignments: The Ultimate Teaching Evaluations

30 Preparing Students for Tests  
Test Preparation Measures  
Anxiety-Reduction Measures  
What the Effort Is Worth

31 Grading Summative Assessments  
The Meaning of Grades  
Summative Assessments and Grading Systems  
The Qualities of a Sound Grading System  
Grading Constructed Responses and Papers
To Greg,
the man behind the woman
Linda B. Nilson is the founding director of Clemson University's Office of Teaching Effectiveness and Innovation. In addition to writing the first two editions of *Teaching at Its Best: A Research-Based Resource for College Instructors* (1998, 2003), she has authored *The Graphic Syllabus and the Outcomes Map: Communicating Your Course* (Jossey-Bass, 2007) and edited a number of volumes: *Enhancing Learning with Laptops in the Classroom* (with Barbara E. Weaver, Jossey-Bass, 2005) and Volumes 25 through 28 of *To Improve the Academy: Resources for Faculty, Instructional, and Organizational Development* (with Douglas Reimondo Robertson, Anker, 2007, 2008; with Judith E. Miller, Jossey-Bass, 2009, 2010). Her other publications are articles and book chapters on teaching with learning objects and mind maps, designing a graphic syllabus, improving student-peer feedback, teaching large classes, getting students to do the readings, critical thinking, scholarly writing and publishing, and graduate student professional development, along with book-length instructional handbooks for three universities. One of her papers (with Ernest N. Biktimirov) won the 2002 Financial Management Association Competitive Paper Award in Financial Education.

Dr. Nilson presents faculty and graduate student workshops and keynotes at colleges, universities, consortia, and conferences in the United States and internationally. Among her faculty development activities was developing and directing the week-long 2008 Institute for Teaching and Learning in Higher Education, sponsored by the South Carolina Teaching Excellence Network. Her workshop repertoire spans every teaching and learning chapter in this book—course design and development, teaching strategies for small and large classes, assessment, classroom management, and student evaluations—along with career development topics, such as preparation of a teaching philosophy, peer assessment of teaching for promotion and tenure, early academic career management, faculty time management, and scholarly writing and publishing.

Before coming to Clemson in 1998, Dr. Nilson directed the Center for Teaching at Vanderbilt University and the Teaching Assistant Development Program at the University of California, Riverside. At the latter institution, she developed the disciplinary cluster approach to training teaching assistants (TAs), a cost-effective way for a centralized unit to provide disciplinary-relevant instructional training. This approach received coverage in the *Chronicle of Higher Education*, and she similarly structured TA training at Vanderbilt. Her entrée into educational development came in the late 1970s while she was on the sociology faculty at UCLA. After she distinguished herself as an excellent instructor, her department selected her...
to establish its Teaching Assistant Training Program. She supervised it for four years, and it still follows her original organization. As a sociologist, she conducted research in the areas of occupations and work, social stratification, political sociology, and disaster behavior. Her career also included several years in the business world as a technical and commercial writer, a training workshop facilitator, and the business editor of a southern California magazine.

Dr. Nilson is active in the Professional and Organizational Development (POD) Network in Higher Education, which honored her work with the 2000 Innovation (Bright Idea) Award, and the Society for Teaching and Learning in Higher Education. She has held leadership positions in the POD Network, the Southern Regional Faculty and Instructional Development Consortium, and Society for the Study of Social Problems, the Public Relations Society of America, Toastmasters International, and Mensa.

A native of Chicago, Dr. Nilson was a National Science Foundation fellow at the University of Wisconsin, Madison, where she received her Ph.D. and M.S. degrees in sociology. She completed her undergraduate work in three years at the University of California, Berkeley, where she was elected to Phi Beta Kappa.
Whatever their Carnegie classification, institutions with high standards of instructional excellence, in particular at the undergraduate level, should warmly welcome this third edition, as so many did the first and second editions. It has been updated and expanded to serve the same audience of new and experienced instructors who are sincerely dedicated to learner-centered teaching at its best. They should find it useful whether they teach young, adult, or highly diverse students and whether they rely on traditional classroom or hybrid formats.

Liberal arts and community colleges as well as other teaching-centered institutions have always promoted high standards of teaching excellence. But time was that no one really cared much what instructors in more research-oriented universities did in the classroom, as long as it was legal. No one—not the students, their parents, colleagues, administrators, accrediting agencies, employers, or any levels of government—scrutinized a faculty member’s teaching methods, which was usually straight lecture, or sought evidence of student learning. Departments barely considered the quality of one’s teaching in hiring, tenure, and promotion decisions. Of course, some instructors deeply cared about their student evaluations, but they usually were the ones who received high ratings and grateful student comments. Otherwise they were rarely rewarded. In fact, these “popular” faculty were suspect. So were those who broached the subject of teaching enhancement with their colleagues.

This time was not a hundred years ago but more like thirty or forty. It was in this chilly environment that Wilbert J. McKeachie was writing and publishing the earliest editions of Teaching Tips. His was the only book of its kind on the market. Of course, the research literature on college teaching and learning was sparse back then. Today that literature would fill rooms, and Teaching Tips is in its twelfth edition, with plenty of competition, including this book you are reading. College instructors across all types of institutions now face a host of internal and external stakeholders; it seems that everyone cares about what they do in the classroom and how they affect students. Who says the academy never changes?

This book has gathered together the fruits of these changes—literally thousands of research-based methods, policies, and practices for being effective in all aspects of teaching, course management, and assessment—and serves them in readily consumable portions so you can confidently try them out in your next class.

The research on college-level teaching is the foundation of and inspiration for this book. It has blossomed into the fertile body of literature called the scholarship of teaching and learning. It encompasses
not only the impact of different instructional methods and learning experiences on student achievement, satisfaction, and knowledge retention, but also recommendations on how to implement these strategies most successfully. Because few faculty have the time to keep abreast of this literature as well as their own discipline, the concise summary of hundreds of teaching options presented here is essential for time saving.

You should use this book as a toolbox for both classroom and technology-enhanced instruction. The tools include not only teaching methods and moves but also face-to-face and online activities and exercises, practices to enhance instructor-student rapport, strategies to make learning easier, and guidelines for designing and grading assignments and papers. With physical tools, you may have to find the right tool for the job. But you usually have the choice of several right tools for a given teaching job, whatever your goals for students. Therefore, I present plenty of alternatives. I avoid playing champion for certain methods over others and the latest innovations over the tried-and-true. Rather, I present the how-to’s and why-do’s for many teaching tools, along with their trade-offs, just as the research reports them, and leave the choices to frontline faculty.

Guiding my decisions on the organization and the writing style was my intention to write this book for people like you who don’t have time to read a book. To ensure easy accessibility and allow rapid reading, the writing style is concise and informal, the paragraphs are relatively brief, most of the thirty-two chapters are short and generously subdivided into sections, and the Contents page is detailed with chapter section headings. In addition, the six major parts are sequenced according to your likely chronological need for the material. Still, you can read the chapters in any order, and the text makes numerous cross-references to other chapters that elaborate on a given subject. So you can casually browse, quickly locate specific topics, and skip over the tools with which you are already familiar.

I wrote this book in the second person and the first-person plural. These writing conventions both personalize the text and make it easier to read. In addition, the second person facilitates presenting the directions, rules, and formulas that some techniques follow. My goal has been to demystify the method, simplify the instructions, and equip you with a new tool right away.

While preserving the most appreciated features of the second edition, this third edition incorporates more and new material—from extensive updates of every topic that new research has addressed to three brand-new chapters, plus a line-by-line editing to further improve the writing. I describe these changes for each part of the book:

Part One, “Laying the Groundwork for Student Learning,” guides you through the tasks to complete before the term begins. Understanding your students and how they learn anchors all your plans, so it is dealt with in the first chapter. The section on how people learn brings in more principles and findings from cognitive psychology, as well as their concrete implications for teaching. It is followed by a lengthy new section on the importance of mental structure in learning, retention, and retrieval. Finally, another new section addresses reaching and teaching the millennial generation. Along with updating the term learning objectives to learning outcomes, Chapters Two and Three on, respectively, course design and the syllabus add Anderson and Krathwohl’s revision of Bloom’s taxonomy of cognitive operations, Fink’s six kinds of learning essential for creating “significant learning experiences,” and a section on developing an outcomes map to show students the learning process you have planned for them. The advice in Chapter Four for your first class meeting adds preclass physical and vocal exercises for enhancing your persona and nonverbal communication. Chapter Five on motivation greatly expands the literature review, explicating four theories of motivation and the evidence for them, and it offers more strategies for motivating students, most of which must be planned into a course. Finally, the sections on inclusive teaching and equity in the classroom offer many more ways to create fertile learning environments in diverse settings.

Part Two, “Managing Your Courses,” targets the administrative side of teaching: the copyright
guidelines to follow, recommended course policies regarding student conduct and academic integrity, and the routines to establish for office hours and with teaching assistants. All of the material on copyright is up-to-date, and the chapter on academic honesty incorporates the latest incidence and prevalence statistics, addresses electronic forms of cheating, and examines the prospect of changing students’ values. Chapter Nine includes more novel ideas for places and settings for office hours, and Chapter Ten adds new literature on the faculty-teaching assistant relationship.

Part Three, “Choosing and Using the Right Tools for Teaching and Learning,” opens with a new chapter on selecting the teaching formats, methods, and moves that are known to help students achieve specific cognitive outcomes. The rest of the chapters (and those in Part Four) describe well-researched instructional methods and lay out ground rules for setting up and managing them to ensure powerful learning experiences. The menu is extensive, varied, and applicable across the disciplines. It also includes many new topics: using clickers (that is, personal response systems or classroom response systems) to add interactive learning value to the lecture; teaching and motivating students to take good lecture notes; fostering civility and managing conflict during discussions; advancing discussion through Bloom’s hierarchy using a question template; posing Brookfield and Preskill’s “momentum” questions; implementing academic games; designing and debriefing your own simulations; acquainting students with small-group dynamics; integrating group processing and self-assessment into group work; and administering group tests.

Part Four, “More Tools: Teaching Real-World Problem Solving,” extends the menu to major methods that help students acquire various problem-solving skills: to resolve the type of open-ended, realistic problems that good cases and problem-based learning present; solve closed-ended quantitative problems; and tackle challenging scientific questions in both lectures and labs. All of the methods covered fall under the general umbrella of inquiry-guided learning, the focus of Chapter Eighteen, which opens this part. This completely new chapter explains the competing definitions of inquiry-guided learning, the evidence for its effectiveness, the best practices in implementing it, possible objects and modes of inquiry, and all the many variations on the inquiry-guided theme. Other new sections in Part Four address peer assessment in quantitative problem solving, the principles of successful science instruction, and an inspiring array of recent innovations in science education, all of which are inquiry guided, problem focused, collaborative, and more successful in promoting learning than the traditional lecture. Some of these innovations call for minor changes in the traditional lecture format, such as peer instruction, the case method, problem-based learning, just-in-time-teaching, and experimental demonstrations, while others transform the entire learning process—for example, the “studio course;” process-oriented guided inquiry learning (POGIL), and student-centered active learning environment for undergraduate programs (SCALE-UP). Research also finds that students similarly benefit from labs that require inductive reasoning to derive scientific principles and nonroutine problem solving.

Part Five, “Making Learning Easier,” groups together types of assignments, class activities, skill development lessons, ways of presenting material, and technology applications that help ensure students learn and retain as much of your material as possible. These strategies include ensuring students do the readings, explaining how your discipline thinks, teaching in different modes and media, adding visual learning aids, and using technologies—from the traditional to the latest Web 2.0 tools—appropriately. Chapter Twenty-Six on teaching with visuals is new. First, it summarizes the research on how the brain processes graphic representations to learn and store more knowledge. Then it provides everything you need to know to incorporate concept maps, mind maps, and concept circle diagrams into your classes: how other faculty have used them successfully (research and examples), how you and your students can create them, and how you can assess your students’ products. Other chapters also present new material:
ways to teach students how to read and comprehend academic material; Felder and Silverman’s Index of Learning Styles; the validity and reliability of learning style models; recent enhancements to learning management systems; updated research on the effects of posting presentation slides online; Web resources for assignments and activities, including learning objects; effective uses of podcasts and vodcasts; and the latest instructional applications of blogs, wikis, social networking tools, and Second Life.

Finally, Part Six, “Assessing Learning Outcomes,” offers guidance first on assessing student learning through activities, tests, and assignments and then on evaluating teaching effectiveness and documenting it for review. New material appears throughout the chapters on first-time topics: writing multiple true-false items for tests (and why you should use them); developing objective test items to assess higher-order thinking skills; grading mechanics quickly while making students learn them; using a new version of contract grading to motivate students; and helping them use your feedback to improve (and why they don’t). Other topics have been expanded or updated: formative feedback methods, ways to prepare students for tests, techniques for grading essay questions and writing assignments, approaches to writing a teaching philosophy, and the complexities of evaluating teaching. The lengthy section on student evaluations offers additional analyses on what they actually measure, how instructor behaviors affect them, how to interpret and improve them, and how they should and shouldn’t be used in personnel decisions.

If you are familiar with an earlier edition of this book, you may also notice that the information on the instructional support and resources that campuses typically offer has been moved from the first chapter to the appendix. In addition, many of the chapters now include Web addresses of particularly valuable resources for you and your students.

I welcomed Jossey-Bass’s invitation to write this third edition and accepted it as an honor. But, of course, it kept me at the computer after hours and on weekends for over a year. My laptop became my faithful travel companion in many airports and on many flights. Unfortunately, the writing and revising cut into precious time with loved ones, especially my dear husband, Greg Bauernfeind. Yet he was my head cheerleader during the entire process of “eating the elephant.” He encouraged my efforts, celebrated my progress, and took care of business on the home front. I lovingly dedicate this edition to him.

LINDA B. NILSON
Clemson, South Carolina
November 2009
TEACHING AT ITS BEST
PART 1

LAYING THE GROUNDWORK FOR STUDENT LEARNING
Whenever we prepare an oral presentation, a publication, or even a letter, the first issue we consider is our audience. The person or people for whom we intend our message influence our content, format, organization, sentence structure, and word choice. The same holds true in teaching. The nature of our students—their academic preparation, aspirations, and cognitive development—affects our choices of what and how to teach. We need to think of our job not as teaching art, biology, English, history, math, psychology, and so on but as teaching students.

Yet another consideration, this one unique to teaching, is how the human mind learns. For any given subset of knowledge, some types and styles of delivery are simply more effective means of communication than others—that is, they make it easier for people to attend to, grasp, and remember. Yet in spite of the fact that we are all responsible for encouraging human minds to learn, it seems that only cognitive or educational psychologists know how the human mind works.

Knowing both who your students are and how their minds learn is the starting point for teaching at its best.

**YOUR UNDERGRADUATE STUDENT BODY PROFILE**

If you’re not already familiar with your student audience, or your experience tells you that its composition has changed, your institution’s admissions or student affairs office can provide the type of student data you need. At a minimum, you should find out the distributions and percentages on these variables: age; marital and family status; socioeconomic background; race and ethnicity; full-time and part-time employed; campus residents versus commuters; native versus international; geographical mix; and special admissions. If your students are primarily young, on-campus residents, for instance, you can afford to make more collaborative out-of-class assignments. You might also benefit from finding out about the
leadership positions and activities that individuals in a given class engaged in when they were in high school.

You also need to know your students’ level of academic preparation and achievement. You can assess your institution’s selectivity by comparing the number of applicants each year with the number of those accepted (a two-to-one ratio or above is highly selective). For each entering class, you can find out about its average scholastic test scores (SATs, ACTs), the percentage ranked at varying percentiles of their high school graduating classes, the percentage of National Merit and National Achievement Finalists (over 5 percent is high), and the percentage that qualified for Advanced Placement credit (over a third is high). For several hundred American colleges and universities, almost all of this information is published every summer in the “America’s Best Colleges” issue of U.S. News & World Report.

Another question you might want to answer is where your students are headed in life. Your institution’s career center should have on file the percentage of students planning on different types of graduate and professional educations, as well as the immediate employment plans of the next graduating class. Often departments and colleges collect follow-up data on what their students are doing a few years after graduation.

### HOW PEOPLE LEARN

Whatever your student body profile, certain well-researched principles about how people learn will apply:

- **People are born learners, beginning from infancy with an insatiable curiosity and an increasing awareness of their learning. They absorb and remember untold billions of details about objects, other people, their language, and things they know how to do (Bransford, Brown, & Cocking, 1999; Spence, 2001).**
- **People learn through elaborative rehearsal, which means connecting new knowledge to what they already know and believe (Bransford et al., 1999; Tigner, 1999).**
- **People learn what they regard as relevant to their lives (Svinicki, 2004).**
- **People learn socially by constructing knowledge in a group (Stage, Kinzie, Muller, & Simmons, 1999), but they otherwise learn one-on-one and on their own (Spence, 2001).**
- **People learn when they are motivated to do so by the inspiration and enthusiasm of other people in their lives (Feldman, 1998b).**
- **People don’t learn well when their major learning context is teacher centered—that is, when they passively listen to a teacher talk. Rather, they learn when they are actively engaged in an activity, a life experience. The human brain can’t focus for long when it is in a passive state (Bligh, 2000; Bonwell & Eison, 1991; Hake, 1998; Jones-Wilson, 2005; McKeachie, 2002; Spence, 2001; Svinicki, 2004).**
- **People learn best when they receive the new material multiple times but in different ways—that is, through multiple senses and modes that use different parts of their brain (Kress, Jewitt, Ogborn, & Charalampous, 2006; Tulving, 1985; Vekiri, 2002).**
- **People learn when they actively monitor their learning and reflect on their performance—a mental operation called metacognition or self-regulated learning (Bransford et al., 1999).**
- Relatedly, people learn less by reviewing material and more from being tested or testing themselves on it, as the latter involves greater cognitive processing and practice retrieving (Dempster, 1996, 1997; Roediger & Karpicke, 2006).
- **People learn better when the material evokes emotional and not just intellectual or physical involvement. In other words, a lasting learning experience must be moving enough to make the material memorable or to motivate people to want to learn it. This learning pattern mirrors the biological basis of learning, which is the close communication between the frontal lobes of the brain and the limbic system. From a biological point of view, learning entails a change in the**

These key learning principles have some complementary teaching principles, and they echo through the rest of this book:

• Hold your students to high expectations. But be reasonable, and don’t use yourself as the standard. Very few students will learn your field as quickly as you did or choose the life of the mind as you have.
• Start where your students are. Find out what they already know and don’t know and what they believe to be true, and become familiar with their lifestyles. Then relate the new content, skills, and abilities you are helping them learn to what is familiar to them, both cognitively and experientially. Use examples and analogies out of their lives and their generational experience.
• Make the material relevant to the students’ lives, which for today’s concrete learners means connecting your material to their day-to-day experience, future careers, or real-world problems.
• Demonstrate enthusiasm and passion for your subject and for teaching it, as these are contagious emotions. If these don’t come naturally to you, learn how to use your voice and body to convey them.
• Assign creative, inventive, and challenging tasks to small groups and more routine learning tasks, such as first-exposure reading and standard problem sets, as individual homework. Some students will need tutoring after their individual attempts at learning, which you, a teaching assistant (TA), or group members can provide. Reflection and writing are also individual learning activities, even though they can be very challenging and creative.
• Use active learning techniques, and when you do lecture, do so interactively—that is, with frequent breaks for student activities.
• When possible, use experiential methods: those that place students in real-life problem-solving situations, simulated or genuine.

• Teach in multiple modalities. Give students the opportunities to read, hear, talk, write, see, draw, think, act, and feel new material into their system. In other words, involve as many senses and parts of the brain as possible in your teaching and their learning. If, as is commonplace, the students are reading or listening to the material, have them take notes on it, discuss it in pairs or groups, concept- or mind-map it, freewrite about it, solve problems with it, complete a classroom assessment exercise on it, or take a quiz on it.
• Teach your students how to learn your material, and build in assignments that make them observe, analyze, and assess how well they are learning.
• Build into your course plenty of assessment opportunities, including low-stakes quizzes, practice tests, in-class exercises, and homework assignments that can tell students how much they are really learning, as well as provide them with retrieval practice.
• Motivate and reinforce learning with emotions. Make a learning experience dramatic, humorous, surprising, joyous, maddening, exciting, or heart-wrenching. Integrate engaging cases and problems to solve, simulations and games, role plays, service-learning, and other experiential learning opportunities into your courses. Let students reflect, debate, consider multiple points of view, write down their reactions to the material, and work cooperatively in groups. Any emotion will aid learning by inducing more enduring changes—that is, the generation of new, lasting synapses—in the brain.

HOW STRUCTURE INCREASES LEARNING

Structure is so key to how people learn and has such far-reaching implications for teaching that it deserves an entire section of its own. In fact, without it, there is no knowledge.

Students are always talking about “information” when they refer to what they are learning. After
all, this is the “information age,” and abundant information is constantly available. It’s a snap to find people’s phone numbers, the capitals of countries, the years of events, directions from one place to another, an area’s major industries, economic figures, political leaders, and election results, to name just a few common pieces of information. But all of these are only facts: isolated bits of information that do not add up to any generalizations or conclusions about the way the world works.

What isn’t so available is knowledge, that is, organized bodies of knowledge, which is what we academics have to offer that information-packed websites do not. Knowledge is a structured set of patterns that we have identified through observation, followed by reflection and abstraction—a grid that we have carefully superimposed on a messy world so we can make predictions and applications (Kuhn, 1970). Knowledge comprises useful concepts, agreed-on generalizations, well-grounded inferences, strongly backed theories, reasonable hypotheses, and well-tested principles and probabilities. Without knowledge, science and advanced technology wouldn’t exist.

Unfortunately, our students come to our courses, and usually leave them, viewing our material as a bunch of absolute, disconnected facts, supplemented by technical terms—about as well organized, meaningful, and memorable as a phone book. These facts and “things” were out there. Human beings “discovered” them; we didn’t construct them. From this perspective, memorization is the only learning strategy that makes sense.

Students are not stupid; they are simply novices in our discipline. They lack a solid base of prior knowledge and may harbor misconceptions and faulty models about the subject matter (Svinicki, 2004). Being unable to identify the central, core concepts and principles (Kozma, Russell, Jones, Marx, & Davis, 1996), they wander somewhat aimlessly through a body of knowledge, picking up and memorizing what may or may not be important facts and terms and using trial-and-error to solve problems and answer questions (Glaser, 1991). They do not see the big picture of the patterns, generalizations, and abstractions that experts recognize so clearly. As a result, they have trouble figuring out how to classify and approach problems at the conceptual level (Arocha & Patel, 1995; Dejong & Ferguson-Hessler, 1996).

Without that big picture, students face another learning hurdle as well. The mind processes, stores, and retrieves knowledge not as a collection of facts but as a logically organized whole, a coherent conceptual framework, with interconnected parts. In fact, it requires a big picture. That framework is what prior knowledge is all about. New material is integrated not into an aggregate of facts and terms but into a preexisting structure of learned knowledge. Without having a structure of the material in their heads, students fail to comprehend and retain new material (Anderson, 1984; Bransford et al., 1999; Rhem, 1995; Svinicki, 2004).

The mind structures knowledge based on patterns and relationships it recognizes across observations. In fact, it is driven to generalize about and simplify reality. If it did not, we would experience repetitive events as novel every time they occurred and would learn and remember nothing from them.

No doubt, we would find reality too complex to operate within and would perish. Animals too have the need and capacity to recognize patterns. They learn to obtain what they need and survive not just by instinct but by learning—for instance, learning to hide, judge distances, time their strikes, and fool their prey—and they get better with practice. The behaviorists call learning by pattern recognition operant conditioning, and they have demonstrated that mammals, birds, reptiles, and probably fish learn this way.

Human thinking is so wired to seek and build structure that we make up connections to fill in the blanks in our understanding of phenomena if we don’t already have a complete explanatory “theory” handy. Some of these made-up connections that pan out under scrutiny are elevated to science. Charles Darwin, for example, did not observe mutations happening in nature; rather, he hypothesized their occurrence to fill in the explanatory blanks for species diversity. No one was around to watch the big bang,