Peer Instruction Users Manual

Dr. Zaslavsky's edition of the text of Tacitus's Agricola has been prepared with an eye to its use as the first complete text with which to challenge learners who have completed a basic course of Latin such as his An Introductory Latin Course: A First Latin Grammar for Middle Schoolers, High Schoolers, College Students, Homeschoolers, and Self-Learners. It is accompanied by historical and grammatical notes, a combination glossary/concordance, and a literal translation.

This package contains the following components: -0132273594: Physics for Scientists & Engineers Vol. 2 (Chs 21-35) -0132274000: Physics for Scientists & Engineers with Modern Physics, Vol. 3 (Chs 36-44) -013613923X: Physics for Scientists & Engineers Vol. 1 (Chs 1-20) with MasteringPhysics(tm)

This book represents the emerging efforts of a growing international network of researchers and practitioners to promote the development and uptake of evidence-based pedagogies in higher education, at something a level approaching large-scale impact. By offering a communication venue that attracts and enhances much needed partnerships among practitioners and researchers in pedagogical innovation, we aim to change the conversation and focus on how we work and learn together – i.e. extending the implementation and knowledge of co–design methods. In this first edition of our Research Topic on Active Learning, we highlight two (of the three) types of publications we wish to promote. First are studies aimed at understanding the pedagogical

designs developed by practitioners in their own practices by bringing to bear the theoretical lenses developed and tested in the education research community. These types of studies constitute the "practice pull" that we see as a necessary counterbalance to "knowledge push" in a more productive pedagogical innovation ecosystem based on research-practitioner partnerships. Second are studies empirically examining the implementations of evidence-based designs in naturalistic settings and under naturalistic conditions. Interestingly, the teams conducting these studies are already exemplars of partnerships between researchers and practitioners who are uniquely positioned as “in-betweens” straddling the two worlds. As a result, these publications represent both the rigours of research and the pragmatism of reflective practice. In forthcoming editions, we will add to this collection a third type of publication -- design profiles. These will present practitioner-developed pedagogical designs at varying levels of abstraction to be held to scrutiny amongst practitioners, instructional designers and researchers alike. We hope by bringing these types of studies together in an open access format that we may contribute to the development of new forms of practitioner-researcher interactions that promote co-design in pedagogical innovation.

Winner of the Virginia and Warren Stone Prize awarded annually by Harvard University Press for an outstanding book on education and society What makes a great teacher great? Who are the professors students remember long after graduation? This book, the conclusion of a fifteen-year study of nearly one hundred

college teachers in a wide variety of fields and universities, offers valuable answers for all educators. The short answer is—it's not what teachers do, it's what they understand. Lesson plans and lecture notes matter less than the special way teachers comprehend the subject and value human learning. Whether historians or physicists, in El Paso or St. Paul, the best teachers know their subjects inside and out—but they also know how to engage and challenge students and to provoke impassioned responses. Most of all, they believe two things fervently: that teaching matters and that students can learn.

Making Co-Nationals, Refugees, and Minorities

Principles to Guide the Use of Educational Technology in College Teaching

Thought Power - Its Control and Culture

Background and Challenges

Cornelii Taciti De Vita Iulii Agricolae Liber

Intentional Tech

The working model for "helping the learner to learn" presented in this book is relevant to any teaching context, but the focus here is on teaching in secondary and college science classrooms. Specifically, the goals of the text are to: *help secondary- and college-level science faculty examine and redefine their roles in the classroom; *define for science teachers a framework for thinking about active learning and the creation of an active learning environment;

and *provide them with the assistance they need to begin building successful active learning environments in their classrooms. Active Learning in Secondary and College Science Classrooms: A Working Model for Helping the Learner to Learn is motivated by fundamental changes in education in response to perceptions that students are not adequately acquiring the knowledge and skills necessary to meet current educational and economic goals. The premise of this book is that active learning offers a highly effective approach to meeting the mandate for increased student knowledge, skills, and performance. It is a valuable resource for all teacher trainers in science education and high school and college science teachers.

At Last! A Comprehensive Guide to Understanding Teens Hormones. Rebellion. Moodiness. Peer pressure. No parent can be fully prepared for all the challenges associated with adolescence. Fortunately, The Teen Owner's Manual is here to answer your most pressing questions: How can I teach my teenager to make smart decisions? How do I keep her safe on the Web? How do I get him to communicate? How and when should I talk to her about sex? Whatever your concerns, you'll find the answers right here—courtesy of parenting author Sarah Jordan and adolescent medicine specialist Dr.

Janice Hillman.

This report provides guidance on how Indonesia can consolidate gains in access to basic education and develop an education system that will support an economy in transition towards high-income status.

What drives a state's choice to assimilate, accommodate or exclude ethnic groups within its territory? In this innovative work on the international politics of nation-building, Harris Mylonas argues that a state's nation-building policies toward non-core groups - individuals perceived as an ethnic group by the ruling elite of a state - are influenced by both its foreign policy goals and its relations with the external patrons of these groups. Through a detailed study of the Balkans, Mylonas shows that how a state treats a non-core group within its own borders is determined largely by whether the state's foreign policy is revisionist or cleaves to the international status quo, and whether it is allied or in rivalry with that group's external patrons. Mylonas injects international politics into the study of nation-building, building a bridge between international relations and the comparative politics of ethnicity and nationalism.

The Physics of Everyday Life

Teaching Large Classes

Active Learning in Secondary and College

Science Classrooms
Peer Instruction: Pearson New International Edition
Active Learning in College Science
Essential Information, Troubleshooting Tips, and Advice for Parents-to-Be
Handbook of Research on Fostering Student Engagement With Instructional Technology in Higher Education

The flipped classroom methodology is one of the latest innovations in the field of education, challenging traditional notions of the classroom experience. Applying this methodology to language learning has the potential to further engage students and drive their understanding of key concepts. Flipped Instruction Methods and Digital Technologies in the Language Learning Classroom explores the latest educational technologies and web-based learning solutions for effective language learning curricula. Featuring emergent research on critical topics and innovations in the field of education, this publication is an essential resource for educators, administrators, instructional designers, pre-service teachers, and researchers in the field of education.

The mission of the book series, Research in Science Education, is to provide a comprehensive view of current and emerging knowledge, research strategies, and policy in

specific professional fields of science education. This series would present currently unavailable, or difficult to gather, materials from a variety of viewpoints and sources in a usable and organized format. Each volume in the series would present a juried, scholarly, and accessible review of research, theory, and/or policy in a specific field of science education, K-16. Topics covered in each volume would be determined by present issues and trends, as well as generative themes related to current research and theory. Published volumes will include empirical studies, policy analysis, literature reviews, and positing of theoretical and conceptual bases.

The ideal one-semester astrophysics introduction for science undergraduates—now expanded and fully updated Winner of the American Astronomical Society's Chambliss Award, Astrophysics in a Nutshell has become the text of choice in astrophysics courses for science majors at top universities in North America and beyond. In this expanded and fully updated second edition, the book gets even better, with a new chapter on extrasolar planets; a greatly expanded chapter on the interstellar medium; fully updated facts and figures on all subjects, from the observed properties of white dwarfs to the latest results from precision cosmology; and additional instructive problem sets. Throughout, the text features the same

focused, concise style and emphasis on physics intuition that have made the book a favorite of students and teachers. Written by Dan Maoz, a leading active researcher, and designed for advanced undergraduate science majors, Astrophysics in a Nutshell is a brief but thorough introduction to the observational data and theoretical concepts underlying modern astronomy. Generously illustrated, it covers the essentials of modern astrophysics, emphasizing the common physical principles that govern astronomical phenomena, and the interplay between theory and observation, while also introducing subjects at the forefront of modern research, including black holes, dark matter, dark energy, and gravitational lensing. In addition to serving as a course textbook, Astrophysics in a Nutshell is an ideal review for a qualifying exam and a handy reference for teachers and researchers. The most concise and current astrophysics textbook for science majors—now expanded and fully updated with the latest research results Contains a broad and well-balanced selection of traditional and current topics Uses simple, short, and clear derivations of physical results Trains students in the essential skills of order-of-magnitude analysis Features a new chapter on extrasolar planets, including discovery techniques Includes new and expanded sections and problems on the physics of shocks, supernova remnants, cosmic-ray acceleration, white dwarf properties,

baryon acoustic oscillations, and more Contains instructive problem sets at the end of each chapter Solutions manual (available only to professors)

At last! A comprehensive guide to worry-free pregnancy! Bringing a baby into the world is one of life's defining moments. But there's no getting around it: Being pregnant can feel overwhelming. Fortunately, The Pregnancy Instruction Manual is here to answer all of your most pressing questions. Will the morning sickness ever go away? How big is my baby at 26 weeks? Are beef jerky cravings normal? How do I ward off the unwanted tummy-touch era? And most of all, will I ever get a good night's rest again? Expectant parents will find the answers here courtesy of veteran mom Sarah Jordan and certified OB-GYN (and three time dad) David Ufberg.

The Teen Owner's Manual

Peer Instruction for Astronomy

Blending Active Learning with Web Technology

Proceedings of ICUPE

Physics for Scientists & Engineers

Handbook of College Science Teaching

Reviews of National Policies for Education Education in Indonesia Rising to the Challenge

The Handbook offers models of teaching and learning that go beyond the typical lecture-laboratory format and provides rationales for new practices in the college classroom. It is ideal for

graduate teaching assistants, senior faculty and graduate coordinators, and mid-career professors in search of reinvigoration.

FOREWORD BY GUY KAWASAKI Presentation designer and internationally acclaimed communications expert Garr Reynolds, creator of the most popular Web site on presentation design and delivery on the Net — presentationzen.com — shares his experience in a provocative mix of illumination, inspiration, education, and guidance that will change the way you think about making presentations with PowerPoint or Keynote. Presentation Zen challenges the conventional wisdom of making "slide presentations" in today's world and encourages you to think differently and more creatively about the preparation, design, and delivery of your presentations. Garr shares lessons and perspectives that draw upon practical advice from the fields of communication and business. Combining solid principles of design with the tenets of Zen simplicity, this book will help you along the path to simpler, more effective presentations.

TIPERs: Sensemaking Tasks for Introductory Physics gives introductory physics students the type of practice they need to

promote a conceptual understanding of problem solving. This supplementary text helps students to connect the physical rules of the universe with the mathematical tools used to express them. The exercises in this workbook are intended to promote sensemaking. The various formats of the questions are difficult to solve just by using physics equations as formulas. Students will need to develop a solid qualitative understanding of the concepts, principles, and relationships in physics. In addition, they will have to decide what is relevant and what isn't, which equations apply and which don't, and what the equations tell one about physical situations. The goal is that when students are given a physics problem where they are asked solve for an unknown quantity, they will understand the physics of the problem in addition to finding the answer.

The Elements of Style William Strunk concentrated on specific questions of usage—and the cultivation of good writing—with the recommendation "Make every word tell"; hence the 17th principle of composition is the simple instruction: "Omit needless words." The book was also listed as one of the 100 best and most influential books written in English since

1923 by Time in its 2011 list.
How Things Work
Operating Instructions, Troubleshooting
Tips, and Advice on Adolescent Maintenance
Publication Manual of the American
Psychological Association
A Guide for Librarians and Students
Sensemaking Tasks for Introductory Physics
Tools and Strategies
TIPERs

How Things Work provides an accessible introduction to physics for the non-science student. Like the previous editions it employs everyday objects, with which students are familiar, in case studies to explain the most essential physics concepts of day-to-day life. Lou Bloomfield takes seemingly highly complex devices and strips away the complexity to show how at their heart are simple physics ideas. Once these concepts are understood, they can be used to understand the behavior of many devices encountered in everyday life. The sixth edition uses the power of WileyPLUS Learning Space with Orion to give students the opportunity to actively practice the physics concepts presented in this edition. This text is an unbound, three hole punched version. Access to WileyPLUS sold separately.

For courses in Introductory Astronomy. Peer Instruction is a simple yet effective method for teaching science. Techniques of Peer Instruction for introductory college Physics classes were developed primarily at Harvard, and have aroused interest and excitement in the Physics Education community. This approach involves students

in the teaching process, making physics more accessible to them. Peer Instruction is a new trend in astronomy that is finding strong interest and is ideally suited to introductory Astronomy classes. This book is an important vehicle for providing common ground for instructors using the method nationwide, and also provides a bridge to future collaborative efforts by instructors. It is key that the instructor has a large number of thought-provoking, conceptual short-answer questions aimed at a variety of class levels. While significant numbers of such questions have been published for use in Physics, Peer Instruction for Astronomy provides the first such compilation for Astronomy.

The National Science Education Standards address not only what students should learn about science but also how their learning should be assessed. How do we know what they know? This accompanying volume to the Standards focuses on a key kind of assessment: the evaluation that occurs regularly in the classroom, by the teacher and his or her students as interacting participants. As students conduct experiments, for example, the teacher circulates around the room and asks individuals about their findings, using the feedback to adjust lessons plans and take other actions to boost learning. Focusing on the teacher as the primary player in assessment, the book offers assessment guidelines and explores how they can be adapted to the individual classroom. It features examples, definitions, illustrative vignettes, and practical suggestions to help teachers obtain the greatest benefit from this daily evaluation

and tailoring process. The volume discusses how classroom assessment differs from conventional testing and grading-and how it fits into the larger, comprehensive assessment system.

The Publication Manual of the American Psychological Association is the style manual of choice for writers, editors, students, and educators in the social and behavioral sciences, nursing, education, business, and related disciplines.

Simple Ideas on Presentation Design and Delivery

Presentation Zen

Astrophysical Concepts

Peer Instruction

Code of Practice for the Housing and Care of Animals Bred, Supplied Or Used for Scientific Purposes

How to Be a Peer Research Consultant

The Flipped Classroom

A practical manual for faculty who use a collaborative approach to education at the post-secondary level. Overviews the cooperative learning process with discussions of its rationale, research base, value, and practical implementation. Also describes a variety of approaches and complementary movements such as classroom research, writing across the curriculum and critical thinking. Annotation copyrighted by Book News, Inc., Portland, OR

Every student brings their own individual set of educational and personal experiences to a research project, and peer research consultants

are uniquely able to reveal this "hidden curriculum" to the researchers they assist. In seven highly readable chapters, How to Be a Peer Research Consultant provides focused support for anyone preparing undergraduate students to serve as peer research consultants, whether you refer to these student workers as research tutors, reference assistants, or research helpers. Inside you'll find valuable training material to help student researchers develop metacognitive, transferable research skills and habits, as well as foundational topics like what research looks like in different disciplines, professionalism and privacy, ethics, the research process, inclusive research consultations, and common research assignments. It concludes with an appendix containing 30 activities, discussion questions, and written reflection prompts to complement the content covered in each chapter, designed to be easily printed or copied from the book. How to Be a Peer Research Consultant can be read in its entirety to gather ideas and activities, or it can be distributed to each student as a training manual. It pays particular attention to the peer research consultant-student relationship and offers guidance on flexible approaches for supporting a wide range of research needs. The book is intended to be

useful in a variety of higher education settings and is designed to be applicable to each institution's unique library resources and holdings. Through mentoring and coaching, undergraduate students can feel confident in their ability to help their peers with research and may be inspired to continue this work as professional librarians in the future.

This classic text - aimed at senior undergraduates and beginning graduate students in physics and astronomy - presents a wide range of concepts in sufficient depth to give the reader a quantitative understanding of the subject. Emphasising physical concepts, it provides the student with a series of astrophysical sketches, concluding with a synthesis of all the subjects discussed in the book, sketching the history of the universe from its beginning to the formation of the Sun and the planets.

Just-in-Time Teaching (JiTT) is a pedagogical approach that requires students to answer questions related to an upcoming class a few hours beforehand, using an online course management system. While the phrase 'Just in time' may evoke shades of slap-dash work and cut corners, JiTT pedagogy is just the opposite. It helps students to view learning as a process that takes time, introspection, and

persistence. Students who experience JiTT come to class better prepared, and report that it helps to focus and organize their out-of-class studying. Their responses to JiTT questions make gaps in their learning visible to the teacher prior to class, enabling him or her to address learning gaps while the material is still fresh in students' minds - hence the label 'just in time'. JiTT questions differ from traditional homework problems in being designed, not only to build cognitive skills, but also to help students confront misconceptions, make connections to previous knowledge, and develop metacognitive thinking practices. Students consequently spend more time on course concepts and ideas, but also read their textbooks in ways that result in more effective and deeper learning. Starting the class with students' work also dramatically changes the classroom-learning environment, creating greater student engagement. This book demonstrates that JiTT has broad appeal across the academy. Part I provides a broad overview of JiTT, introducing the pedagogy and exploring various dimensions of its use without regard to discipline. Part II of the book demonstrates JiTT's remarkable cross-disciplinary impact with examples of applications in physics, biology, the

geosciences, economics, history, and the humanities.

The Case for Evidence-Based Practice

Flipped Instruction Methods and Digital Technologies in the Language Learning Classroom

Cooperative Learning for Higher Education Faculty

Rising to the Challenge

Student Text, Edited With Introduction, Notes, and Literal Translation

Classroom Assessment and the National Science Education Standards

Creating Active Learning Environments

Peer InstructionA User's ManualPearson

Chalkboards and projectors are familiar tools for most college faculty, but when new technologies become available, instructors aren't always sure how to integrate them into their teaching in meaningful ways. For faculty interested in supporting student learning, determining what's possible and what's useful can be challenging in the changing landscape of technology. Arguing that teaching and learning goals should drive instructors' technology use, not the other way around, Intentional Tech explores seven

research-based principles for matching technology to pedagogy. Through stories of instructors who creatively and effectively use educational technology, author Derek Bruff approaches technology not by asking "How to?" but by posing a more fundamental question: "Why?"

Resource added for the Foundations of Teacher Education 105222 and Paraeducator (Instructional Assistant) 315222 programs.

Student engagement relies on the students and their willingness to participate in the learning process and can be enhanced through the application of various technologies within learning environments. However, strategies for implementing these technologies need research and development to be implemented effectively. The Handbook of Research on Fostering Student Engagement With Instructional Technology in Higher Education is a comprehensive academic publication that focuses on the engagement of learners with academics in higher education and especially how this engagement can be fostered with the integration of new

technologies. Featuring an array of topics such as gamification, digital literacy, and social networking, this book is ideal for instructors, educators, administrators, curriculum developers, instructional designers, IT consultants, educational software developers, researchers, academicians, and students.

Second Edition

Just-in-time Teaching

Principles & Practice of Physics

The Elements of Style

Revitalizing Undergraduate Science

The Pregnancy Instruction Manual

A Working Model for Helping the Learner To Learn

The authors explain how a group of higher education schools used just-in-time teaching (JiTT) methods to increase interactivity for the physics student. By enhancing courses with multimedia Web activities and electronic communications, the classroom environment allowed less dependence on lecture and more rapid responses to students' problems.

This book explains why so few efforts at reforming science education are successful, and why it is that the 300 studies on the subject published over the past decade have done little more than add to a growing body of literature. The book describes programs which

are successful in terms of faculty accomplishments, students graduated and entering advanced study or professional workplace, and showing evidence of high morale among both faculty and undergraduates. Common elements in many of these programs are abandonment of an almost exclusive emphasis on problem solving and modification of the lecture format to permit teaching of underlying concepts. Other variations in traditional introductory physics and chemistry courses are aimed at persuading those simply fulfilling graduation requirements to major in science; at bringing minority students into the fold; or at combining physics or various sub-fields of chemistry in different ways to promote better understanding. Harvard's "chem-phys," is provided as an example of such a combination, but also as a case study of how innovation can be stymied by a lack of university-wide change. The author uses methods of ethnography in reporting what makes individual programs interesting, what their faculty are doing, and what program participants are thinking. (PR)

Annotation The proceedings of the August 1996 conference, arranged in two volumes, focus on the physics baccalaureate as passport to the workplace; physics courses in service of students in other sciences and engineering; and the physics department's responsibility in pre- and in-service education of teachers. Issues include the changing goals of physics courses, the impact of physics education research on

instruction, and applications of modern technologies. Volume 1 contains the presentations and poster papers; volume 2 contains description of 18 sample classes. No index. Annotation c. by Book News, Inc., Portland, Or.

From the FOREWORD. THIS little book is intended to help the student to study his own nature, so far as its intellectual part is concerned. If he masters the principles herein laid down, he will be in a fair way to co-operate with Nature in his own evolution, and to increase his mental stature far more rapidly than is possible while he remains ignorant of the conditions of his growth. The Introduction may offer some difficulties to the lay reader, and may perhaps be skipped by such at the first reading. It is necessary, however, as a foundation for those who would see the relation of the intellect to the other parts of their nature and to the outer world. And those who would fulfill the maxim, ""Know thyself,"" must not shrink from a little mental exertion, nor must expect mental food to drop ready-cooked from the sky into a lazily-opened mouth. If the booklet help even a few earnest students, and clear some difficulties out of the way, its purpose will have been served. -Annie Besant.

Why Some Things Work and Most Don't

Practice of Physics

Learners, Contexts, and Cultures

Active Learning: Theoretical Perspectives, Empirical Studies and Design Profiles

Reform in Undergraduate Science Teaching for the 21st Century

The Changing Role of Physics Depts. in Modern Universities

Teaching with Classroom Response Systems

There are many reasons to be curious about the way people learn, and the past several decades have seen an explosion of research that has important implications for individual learning, schooling, workforce training, and policy. In 2000, How People Learn: Brain, Mind, Experience, and School: Expanded Edition was published and its influence has been wide and deep. The report summarized insights on the nature of learning in school-aged children; described principles for the design of effective learning environments; and provided examples of how that could be implemented in the classroom. Since then, researchers have continued to investigate the nature of learning and have generated new findings related to the neurological processes involved in learning, individual and cultural variability related to learning, and educational technologies. In addition to expanding scientific understanding of the mechanisms of learning and how the brain adapts throughout the lifespan, there have been important discoveries about influences on learning, particularly sociocultural

factors and the structure of learning environments. How People Learn II: Learners, Contexts, and Cultures provides a much-needed update incorporating insights gained from this research over the past decade. The book expands on the foundation laid out in the 2000 report and takes an in-depth look at the constellation of influences that affect individual learning. How People Learn II will become an indispensable resource to understand learning throughout the lifespan for educators of students and adults.

Based on his storied research and teaching, Eric Mazur's Principles & Practice of Physics builds an understanding of physics that is both thorough and accessible. Unique organization and pedagogy allow students to develop a true conceptual understanding of physics alongside the quantitative skills needed in the course. New learning architecture: The book is structured to help students learn physics in an organized way that encourages comprehension and reduces distraction. Physics on a contemporary foundation: Traditional texts delay the introduction of ideas that we now see as unifying and foundational. This text builds physics on those unifying foundations, helping students to develop an understanding that is stronger, deeper, and

fundamentally simpler. Research-based instruction: This text uses a range of research-based instructional techniques to teach physics in the most effective manner possible. The result is a groundbreaking book that puts physics first, thereby making it more accessible to students and easier for instructors to teach. Build an integrated, conceptual understanding of physics: Help students gain a deeper understanding of the unified laws that govern our physical world through the innovative chapter structure and pioneering table of contents. Encourage informed problem solving: The separate Practice Volume empowers students to reason more effectively and better solve problems.

In this useful and practical book, Elisa Carbone offers a wealth of sound advice on how to deal with a large class, from the first day to end of term evaluations. Full of examples taken from many different disciplines, Teaching Large Classes will be an ideal companion for any teacher facing the challenge of the large introductory class.

Peer Instruction: A User's Manual is a step-by-step guide for instructors on how to plan and implement Peer Instruction lectures. The teaching methodology is applicable to a variety of introductory science courses

(including biology and chemistry). However, the additional material--class-tested, ready-to-use resources, in print and on CD-ROM (so professors can reproduce them as handouts or transparencies)--is intended for calculus-based physics courses.

Across the Disciplines, Across the Academy

Astrophysics in a Nutshell

The Politics of Nation-Building

What the Best College Teachers Do

How People Learn II

A User's Manual

Peer Instruction: A User's Manual is a step-by-step guide for instructors on how to plan and implement Peer Instruction lectures. The teaching methodology is applicable to a variety of introductory science courses (including biology and chemistry). However, the additional material–class-tested, ready-to-use resources, in print and on CD-ROM (so professors can reproduce them as handouts or transparencies)–is intended for calculus-based physics courses.

There is a need in the higher education arena for a book that responds to the need for using technology in a classroom of tech-savvy students. This book is filled with illustrative examples of questions and teaching activities that use classroom response systems from a variety of disciplines (with a discipline index). The book also incorporates results from research on the effectiveness of the technology for teaching. Written for instructional designers and re-designers as well as faculty across

disciplines. A must-read for anyone interested in interactive teaching and the use of clickers. This book draws on the experiences of countless instructors across a wide range of disciplines to provide both novice and experienced teachers with practical advice on how to make classes more fun and more effective."--Eric Mazur, Balkanski Professor of Physics and Applied Physics, Harvard University, and author, Peer Instruction: A User's Manual "Those who come to this book needing practical advice on using 'clickers' in the classroom will be richly rewarded: with case studies, a refreshing historical perspective, and much pedagogical ingenuity. Those who seek a deep, thoughtful examination of strategies for active learning will find that here as well—in abundance. Dr. Bruff achieves a marvelous synthesis of the pragmatic and the philosophical that will be useful far beyond the life span of any single technology." --Gardner Campbell, Director, Academy for Teaching and Learning, and Associate Professor of Literature, Media, and Learning, Honors College, Baylor University

This book explores evidence-based practice in college science teaching. It is grounded in disciplinary education research by practicing scientists who have chosen to take Wieman's (2014) challenge seriously, and to investigate claims about the efficacy of alternative strategies in college science teaching. In editing this book, we have chosen to showcase outstanding cases of exemplary practice supported by solid evidence, and to include practitioners who offer models of teaching and learning

that meet the high standards of the scientific disciplines. Our intention is to let these distinguished scientists speak for themselves and to offer authentic guidance to those who seek models of excellence. Our primary audience consists of the thousands of dedicated faculty and graduate students who teach undergraduate science at community and technical colleges, 4-year liberal arts institutions, comprehensive regional campuses, and flagship research universities. In keeping with Wieman's challenge, our primary focus has been on identifying classroom practices that encourage and support meaningful learning and conceptual understanding in the natural sciences. The content is structured as follows: after an Introduction based on Constructivist Learning Theory (Section I), the practices we explore are Eliciting Ideas and Encouraging Reflection (Section II); Using Clickers to Engage Students (Section III); Supporting Peer Interaction through Small Group Activities (Section IV); Restructuring Curriculum and Instruction (Section V); Rethinking the Physical Environment (Section VI); Enhancing Understanding with Technology (Section VII), and Assessing Understanding (Section VIII). The book's final section (IX) is devoted to Professional Issues facing college and university faculty who choose to adopt active learning in their courses. The common feature underlying all of the strategies described in this book is their emphasis on actively engaging students who seek to make sense of natural objects and events. Many of the strategies we highlight emerge from a constructivist view of learning

that has gained widespread acceptance in recent years. In this view, learners make sense of the world by forging connections between new ideas and those that are part of their existing knowledge base. For most students, that knowledge base is riddled with a host of naïve notions, misconceptions and alternative conceptions they have acquired throughout their lives. To a considerable extent, the job of the teacher is to coax out these ideas; to help students understand how their ideas differ from the scientifically accepted view; to assist as students restructure and reconcile their newly acquired knowledge; and to provide opportunities for students to evaluate what they have learned and apply it in novel circumstances. Clearly, this prescription demands far more than most college and university scientists have been prepared for.