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BioInquiry The American
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CK-12 Biology Teacher's
Edition Science Education and
Teacher Professional
Development Biology
Improving College Biology
Teaching NSTA Tool Kit for
Teaching Evolution Action
Science Active Science Level 5
Research in the Life Sciences
with Dual Use Potential
Biological Science Biological
Perspectives Teaching Tools

Spurred on by new discoveries
and rapid technological
advances, the capacity for life
science research is expanding
across the globe—and with it
comes concerns about the
unintended impacts of research
on the physical and biological
environment, human well-

being, or the deliberate misuse
of knowledge, tools, and
techniques to cause harm. This
report describes efforts to
address dual use issues by
developing institutes around
the world that will help life
sciences faculty learn to teach
about the responsible conduct
of science. Based on the
successful National Academies
Summer Institute for
Undergraduate Biology
Education and on previous
NRC reports on effective
methods for teaching about
dual use issues, the report's
authoring committee designed
a general framework for the
faculty institutes and chose the
Middle East-North Africa
(MENA) region to test a

prototype faculty institute. In
September 2012, the first
Institute was held in Aqaba,
Jordan, bringing together 28
participants from Algeria,
Egypt, Jordan, Libya, and
Yemen to engage with
effective, evidence-based
teaching methods, develop
curricular materials for use in
their own classrooms, and
become community leaders on
dual use and related topics.
Developing Capacities for
Teaching Responsible Science
in the MENA Region:
Refashioning Scientific
Dialogue offers insights from
the institute that will help in
the design and implementation
of future programs in the
MENA region, and in other

parts of the world. CK-12 Biology Teacher's Edition complements the CK-12 Biology Student Edition FlexBook. Intended as a guide for teachers to promote active learning in the biology classroom, this book presents the philosophy of active learning and guidelines for using open-ended experiments, co-operative learning and exercises that enhance learning skills to promote active participation by a wide range of students. It provides practical advice about how to build a classroom community in which students are active participants, not simply receptacles of information and how to foster curiosity and

creativity while teaching the rigorous application of the scientific method. Supports and motivates you as you learn to think like a biologist. Building upon Scott Freeman's unique narrative style that incorporates the Socratic approach and draws you into thinking like a biologist, the Fourth Edition has been carefully refined to motivate and support a broader range of learners as they are introduced to new concepts and encouraged to develop and practice new skills. Each page of the book is designed in the spirit of active learning and instructional reinforcement, equipping novice learners with tools that help them advance in

the course—from recognizing essential information in highlighted sections to demonstrating and applying their understanding of concepts in practice exercises that gradually build in difficulty. The term scientific inquiry as manifest in different educational settings covers a wide range of diverse activities. The differences in types of scientific inquiry can be organized along a continuum according to the degree of teacher control and intellectual sophistication involved in each type of inquiry. Types of scientific inquiry can also be defined according to whether they produce cultural knowledge or personal

knowledge. Authentic scientific inquiry is defined according to five characteristics: development of personal and cultural knowledge; contextualized scientific knowledge; the progression toward high-order problem solving; social interaction for scientific goals; and scientific inquiry as a multi-stage and multi-representational process. The definition of scientific inquiry that forms the basis for the development of an assessment program consists of a two-part analytical frame: the definition of knowledge types relevant to scientific inquiry and the definition of an organizational frame for these knowledge types. Four types of knowledge

are significant for the definition of a specific scientific inquiry program: cognitive knowledge, physical knowledge, representational knowledge, and presentational knowledge. All four of these knowledge types are considered significant. These four types of knowledge are organized in a framework that consists of two intersecting axes: the axis of knowledge types and the axis of stages of a scientific inquiry. This framework describes scientific inquiry as a multi-stage process that involves the development of a series of in-lab outcomes (representations) over an extended period of time. "Medical Terminology: Active

Learning Through Case Studies is the only existing medical terminology text that is focused entirely on a case-based approach. Medical terminology can be a daunting course for students, but can be made less overwhelming when students realize that common combining forms, prefixes, and suffixes are used to build most medical terms. This book encourages consideration of medical words in terms of their component parts to determine meaning in context"-- By making room for this book in your curriculum, you'll have a fresh way to motivate your students to look at the living world and ask not only "Why?" but also "How do we know?" Unique in both its

structure and approach, Reading Nature is a supplemental resource that provides a window into science ideas and practices. You'll find the book useful because it * Draws on carefully selected peer-reviewed articles so that students have an opportunity for text-based inquiry into scientific investigations. Each of these evidence-based texts ties into one of five disciplinary core ideas in the Next Generation Science Standards-- from molecules to organisms, ecosystems, heredity, biological evolution, and human impacts on Earth systems. * Is organized to make the source material easy for students to grasp and for you to teach.

Within each of the book's five chapters, the authors have framed section headings as questions; highlighted the roles of people in the narrative; offered context and relevant data for the investigations; and provided supplementary teacher questions and prompts. * Can be adapted to your needs as an active tool for inquiry. You may use the various texts in the book to introduce a unit or an investigation or to pull ideas together before a summative assessment. The texts are also useful as extensions of existing ideas. Unlike traditional textbooks, Reading Nature makes it clear that biology is much more than dry facts and complicated

vocabulary. It can help you prompt students to think deeply about the "endeavor of science" as it truly is-- full of ingenious experiments, frustrating dead ends, and incredible finds that contribute to our understanding of the amazing phenomena of living things. The Third Edition of "Biology: Science for Life" continues to draw readers into biology through engaging stories that make difficult topics more accessible and understandable. Colleen Belk and Virginia Borden strive to make teaching and learning biology a better experience from both sides of the desk. The authors draw from their teaching experiences to create

a book with a flowing narrative and innovative features that require readers to become more active participants in their learning. Each chapter presents the material through a story that draws from real life examples, making the reading more engaging and accessible to today's readers. These stories strive to demystify topics found in biology. The Third Edition of this book features a completely re-designed art program and uses the authors' teaching experiences to create student-centered features such as the new Savvy Reader, Visualize This, and Stop and Stretch to motivate and encourage reader learning. The new A Closer

Look allows instructors the opportunity to expand on certain important biological topics. For instructors who would like to cover Animal Structure and Function and Plant Biology, an alternate edition of this book, "Biology: Science for Life with Physiology," is also available. Can Science Cure the Common Cold? Introduction to the Scientific Method, Are We Alone in the Universe? Water, Biochemistry, and Cells, Diet. Cells and Metabolism, Life in the Greenhouse: Photosynthesis Cellular Respiration, and Global Warming, Cancer: DNA Synthesis, Mitosis, and Meiosis, Are You Only as Smart

as Your Genes? Mendelian and Quantitative Genetics, DNA Detective: Complex Patterns of Inheritance and DNA Fingerprinting, Gene Expression, Mutation and Cloning: Genetically Modified Organisms, Where Did We Come From? The Evidence for Evolution, An Evolving Enemy: Natural Selection, Who Am I? Species and Races, Prospecting for Biological Gold: Biodiversity and Classification, Is the Human Population Too Large? Population Ecology, Conserving Biodiversity: Community and Ecosystem Ecology, Where Do You Live? Climate and Biomes, Organ Donation: Tissues, Organs, and Organ Systems, Clearing the Air: Respiratory,

Cardiovascular, and Excretory Systems, Will Mad Cow Disease Become an Epidemic? Immune System, Bacteria, Viruses, and Other Pathogens, Sex Differences and Athleticism: Endocrine, Skeletal, and Muscular Systems, Is There Something in the Water? Reproductive and Developmental Biology, Attention Deficit Disorder: Brain Structure and Function, Feeding the World: Plant Structure and Growth, Growing a Green Thumb: Plant Physiology. Intended for those interested in learning the basics of biology Intended as a guide for teachers to promote active learning in the biology classroom, this book presents

the philosophy of active learning and guidelines for using open-ended experiments, co-operative learning and exercises that enhance learning skills to promote active participation by a wide range of students. It provides practical advice about how to build a classroom community in which students are active participants, not simply receptacles of information and how to foster curiosity and creativity while teaching the rigorous application of the scientific method. In an era of globalization and urbanization, various social, economic, and environmental challenges surround advances in modern biological sciences.

Considering how biological knowledge and practice are intrinsically related to building a sustainable relationship between nature and human society, the roles of biology education need to be rethought to respond to issues and changes to life in this biocentury. This book is a compilation of selected papers from the Twenty Third Biennial Conference of the Asian Association for Biology Education 2010. The title, Biology Education for Social and Sustainable Development, demonstrates how rethinking and reconstruction of biology education in the Asia-Pacific region are increasingly grounded in deep

understandings of what counts as valuable local knowledge, practices, culture, and ideologies for national and global issues, and education for sustainable development. The 42 papers by eminent science educators from Australia, China, Philippines, Singapore, Taiwan, and the U.S., represent a diversity of views, understandings, and practices in biology education for sustainable development from school to university in diverse education systems and social-cultural settings in the Asia-Pacific region and beyond. The book is an invaluable resource and essential reference for researchers and educators on Asian perspectives and

practices on biology education for social and sustainable development. Build and assess your students' Science knowledge, understanding and skills through better learning techniques, ensuring a solid foundation for further science study. - Confidently meet the requirements of the Trinidad & Tobago, Barbados, Guyana and OECS curricula and CXC's CCLC syllabus with detailed mapping grids available for free online. - Inspire students to progress with this contemporary take on Science that includes topics such as environmental science and green issues. - Engage students through an active learning approach with hands-on

activities to promote learning through practice. - Prepare students for moving up to CSEC® level science with activities developed to bridge the gap between lower secondary and CSEC® level. For courses in General, Organic, and Biological Chemistry (2 - Semester) A Clear, Flexible Approach to Chemistry for the Modern Classroom Active learning, an increased focus on clinical examples, updates based on current teaching and research findings, and digital innovations designed to engage and personalize students' experience make Fundamentals of General, Organic, and Biological Chemistry simply the

best choice for students with a future in allied health. With the Eighth Edition, the authors make learning chemistry a more active experience through features designed to get students doing chemistry. Every chapter features Hands on Chemistry sections that deepen students' understanding of chemistry by having them perform elementary experiments with everyday household items. Group Problems at the end of every chapter are designed for in-class use and motivate students toward higher level thinking, such as how concepts fit together and how to apply these concepts in a clinical application. All of the chapter

openers, including many of the Chemistry in Action boxes and end-of-chapter problems, have been rewritten for a stronger clinical focus that provides more relevance to allied health majors. All content has been updated for the modern classroom with special attention to the biochemistry chapters, making the Eighth Edition of Fundamentals of General, Organic and Biological Chemistry the best choice for future allied health students.

MasteringChemistry™ not included. Students, if MasteringChemistry is a recommended/mandatory component of the course, please ask your instructor for

the correct ISBN and course ID. MasteringChemistry should only be purchased when required by an instructor. Instructors, contact your Pearson representative for more information.

MasteringChemistry is an online homework, tutorial, and assessment system, designed to improve results by engaging students before, during, and after class with powerful content. Instructors ensure students arrive ready to learn by assigning educationally effective content before class, and they encourage critical thinking and retention with in-class resources such as Learning Catalytics™. This book presents a radical

reconceptualization of subject-focused and research-led teacher professional development. Drawing on the experiences of more than 50 high school teachers and technicians who participated in science-based research with their students, the author examines how this enables teachers to develop a 'Teacher Scientist' model of professional identity. Through active participation in research, science teachers and technicians can implement socially just approaches to education, where students' differences are valued and, through research, their social and academic development is supported. Central to the

'Teacher Scientist' identity is the development of, and sustained interaction with, complex and collaborative professional networks which include researchers, university-staff and teachers and students in other schools. In the context of persistent recruitment and retention challenges, the 'Teacher Scientist' model provides a research-led approach which may offer an alternative to strategies focused on financial incentives. The NSTA Tool Kit for Teaching Evolution pulls together historical facts, scientific data, legal precedent, and other invaluable information. Biology and life science teachers will appreciate this resource for its

ability to help cover a relevant issue with depth and pedagogical support. From its inception, this NSF-sponsored learning system was hailed as a welcome departure from traditional approaches, both in terms of organization and delivery of content. BioInquiry tells the story of the process of science, and so is organized to trace scientists' journey to biological understanding, beginning with Darwin and evolution. The Third Edition's unique integration of multimedia - developed in tandem with the text and designed provides additional dimension to key topics. The result is an integrated product that presents a more realistic

approach to what non-science majors need to be informed citizens and scientifically literate consumers of information. An Interactive, Easy-to-Use Introductory Guide to Major Biology Concepts For students looking for a solid introduction to Biology, the new 3rd Edition of Biology: A Teaching Guide is the perfect learning tool. The latest edition has been updated to include the most up-to-date information on everything from photosynthesis to physiology. For students preparing for exams or individuals who want to review material from years past, the step-by-step format is designed to help students and teachers alike easily

understand complex concepts, key terms, and frequently asked questions. The guide includes a comprehensive glossary and self-test questions in each chapter, allowing students to reinforce their knowledge and better understand the concepts. In A Teaching Guide, learn about the foundational aspects of biology, including: ● How photosynthesis occurs ● Whether viruses are living or dead ● The reproductive sexual terms behind cloning ● Comprehensive treatment of all aspects of life science Thoroughly updated with self-teaching practice exams and questions, this comprehensive guide is designed to give

students the tools they need to master the fundamental concepts and critical definitions behind biology. In many countries, colleges and universities are where the majority of innovative research is done; in all cases, they are where future scientists receive both their initial training and their initial introduction to the norms of scientific conduct regardless of their eventual career paths. Thus, institutions of higher education are particularly relevant to the tasks of education on research with dual use potential, whether for faculty, postdoctoral researchers, graduate and undergraduate students, or technical staff.

Research in the Life Sciences with Dual Use Potential describes the outcomes of the planning meeting for a two-year project to develop a network of faculty who will be able to teach the challenges of research in the life sciences with dual use potential. Faculty will be able to incorporate such concepts into their teaching and research through exposure to the tenets of responsible conduct of research in active learning teaching methods. This report is intended to provide guidelines for that effort and to be applicable to any country wishing to adopt this educational model that combines principles of active learning and training with

attention to norms of responsible science. The potential audiences include a broad array of current and future scientists and the policymakers who develop laws and regulations around issues of dual use. Designed to support the flipped classroom method of teaching, *Biology: Textbook and Activities for the Flipped Classroom* introduces students to the fundamentals of biology. Each lesson in the textbook is complemented by a variety of active learning exercises and assessment questions. To promote interdisciplinary connections and big-picture thinking, students learn the historical, ethical, sociological, and

technological implications of key concepts in biology. Over the course of 15 chapters and numerous activities, students learn the basics of scientific inquiry, atoms and molecules, DNA structure and replication, genetic mutations, and transcription and translation. They are introduced to Mendelian genetics, the connection between cell division and cancer, evolution, the immune system, and infectious diseases. The final module is dedicated to biotechnology, providing students a glimpse into gene cloning, DNA sequencing, and gene editing. *Biology* provides students with an immersive and engaging introduction to

biology and life science. It is well suited to flipped biology courses, particular those for non-science majors. The 12th edition of Life: The Science of Biology continues to be engaging, active, and focused on teaching the skills that students need to master. New pedagogical features support the mission of Life by teaching students the skills and understanding of experimentation and data they need to succeed in introductory biology and ultimately in their future STEM careers. Life's potent combination of expertly crafted pedagogy and engagement makes this new edition the best resource yet for biology students. Note: This

text is the instructor's version. For student use, order Handelsman et al: Biology Brought to Life Lab Manual (0-07-282374-7). Biology Brought to Life is a unique guide for helping instructors promote active learning in the biology classroom. This manual provides practical advice and detailed instructions for implementing open-ended experiments, cooperative learning, and exercises that enhance learning skills in large or small introductory biology courses. Its methods are designed to excite students about science, to foster analytical and critical thinking skills, and to reach a broad group of students with diverse

learning styles. Biology Brought to Life features eleven open-ended experiments that illustrate fundamental principles of biology and teach students how to apply the scientific method to investigation of biological problems. The Instructor's Version also presents general principles for using cooperative learning and specific examples of how to apply those principles in a biology course. The materials are intended for majors and nonmajors biology courses and for biology instructors looking for ways to incorporate inquiry-based, active learning and microbiological examples into their courses. Biology Inquiries

offers educators a handbook for teaching middle and high school students engaging lessons in the life sciences. Inspired by the National Science Education Standards, the book bridges the gap between theory and practice. With exciting twists on standard biology instruction the author emphasizes active inquiry instead of rote memorization. *Biology Inquiries* contains many innovative ideas developed by biology teacher Martin Shields. This dynamic resource helps teachers introduce standards-based inquiry and constructivist lessons into their classrooms. Some of the book's classroom-tested lessons are

inquiry modifications of traditional "cookbook" labs that biology teachers will recognize. *Biology Inquiries* provides a pool of active learning lessons to choose from with valuable tips on how to implement them. 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. 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. Active science: Level 1. Seasoned classroom veterans, pre-tenured faculty, and neophyte teaching assistants alike will find this book invaluable. HHMI Professor Jo Handelsman and her colleagues at the Wisconsin Program for Scientific Teaching (WPST) have distilled

key findings from education, learning, and cognitive psychology and translated them into six chapters of digestible research points and practical classroom examples. The recommendations have been tried and tested in the National Academies Summer Institute on Undergraduate Education in Biology and through the WPST. Scientific Teaching is not a prescription for better teaching. Rather, it encourages the reader to approach teaching in a way that captures the spirit and rigor of scientific research and to contribute to transforming how students learn science. Authoritative, thorough, and engaging, *Life: The Science of*

Biology achieves an optimal balance of scholarship and teachability, never losing sight of either the science or the student. The first introductory text to present biological concepts through the research that revealed them, *Life* covers the full range of topics with an integrated experimental focus that flows naturally from the narrative. This approach helps to bring the drama of classic and cutting-edge research to the classroom - but always in the context of reinforcing core ideas and the innovative scientific thinking behind them. Students will experience biology not just as a litany of facts or a highlight reel of experiments, but as a rich,

coherent discipline. This unique resource is packed with novel and innovative ideas and activities you can put to use immediately to enliven and enrich your teaching of biology, streamline your classroom management, and free up your time to accomplish the many other tasks teachers constantly face. For easy use, materials are printed in a big 8 x 11 lay-flat binding that opens flat for photo-copying of evaluation forms and student activity sheets, and are organized into five distinct sections: 1. Innovative Classroom Techniques for the Teacher presents technique to help you stimulate active students participation in the learning

process, including an alternative to written exams ways to increase student responses to questions and discussion topics a student study clinic mini-course extra credit projects a way to involve students in correcting their own tests and more. 2. Success-Directed Learning in the Classroom shows how you can easily make your students accountable for their own learning and eliminate your role of villain in the grading process. 3. General Classroom Management provides solutions to a variety of management issues, such as laboratory safety, the student opposed to dissection, student lateness to class, and the chronic

discipline problem, as well as innovative ways to handle such topics as keeping current in subject-matter content, parent-teacher conferences, preventing burnout, and more. 4. An Inquiry Approach to Teaching details a very effective approach that allows the students to participate as real scientist in a classroom atmosphere of inquiry learn as opposed to lab manual cookbook learning. 5. Sponge Activities gives you 100 reproducible activities you can use at the beginning of, during, or at the end of class periods. These are presented in a variety of formats and cover a wide range of biology topics, including the cell classification

.. plants animals protists the microphone systems of the body anatomy physiology genetics and health. And to help you quickly locate appropriate worksheets in Section 5, all 100 worksheets in the section are listed in alphabetical order in the Contents, from Algae (Worksheets 5-1) through Vitamins and Minerals (Worksheets 5-100). For the beginning teacher new to the classroom situation as well as the more experienced teacher who may want a new lease on teaching, Biology Teachers Survival Guide is designed to bring fun, enjoyment, and profit to the teacher-student rapport that is called teaching.

Biology is where many of science's most exciting and relevant advances are taking place. Yet, many students leave school without having learned basic biology principles, and few are excited enough to continue in the sciences. Why is biology education failing? How can reform be accomplished? This book presents information and expert views from curriculum developers, teachers, and others, offering suggestions about major issues in biology education: what should we teach in biology and how should it be taught? How can we measure results? How should teachers be educated and certified? What obstacles

are blocking reform? Create meaningful and transformative K-5 STEAM learning experiences for each and every student. Make the most of your limited instructional time and become part of the Step into STEAM movement! Seamlessly design and implement K-5 STEAM inquiries that align carefully to key mathematics and science content and practices and prepare elementary students for their bright futures. Taking an opposite approach to existing resources that provide collections of disjointed STEAM activities, this book empowers teachers and schools to build cohesive and sustainable STEAM

infrastructures—grounded in grade-level standards and purposeful assessment—to deepen the mathematics and science learning of each and every student. Biology teachers, you're in luck, BSCS (Biological Sciences Curriculum Study) presents a wealth of current information in this new, updated edition of the classic *The Biology Teachers's Handbook*. No matter the depth of your experience, gain insight into what constitutes good teaching, how to guide students through inquiry at

varying levels, and how to create a culture of inquiry in your classroom using science notebooks and other strategies. In addition, learn tactics for including controversial subjects in your courses, promoting scientific discussion, and choosing the right materials, information that would benefit the teacher of any subject. BSCS experts have packed this volume with the latest, most valuable teaching ideas and guidelines. Their suggestions include designing your courses around five questions, all answered in the book's five

sections: What are the goals of the program for my students and me? How can I help students understand the nature of science? How do I teach controversial topics? How can I create a culture of scientific inquiry in my classroom? Where has biology teaching been, and where is it going? This book provides an approach to physical science instruction in a way that is interesting and engaging to students featuring author-created action sports videos and classroom activities focused on physical science concepts.