Scientific Thinking

"If there is the most productive work to science, it is one that seeks new relationships between branches of knowledge generally divided and promotes the association of certain attitudes to open original ways in search of the truth." Enriques, Science and rationalism (1912).Prejudices, preconceptions are still a substantial part of our culture, of our way of living and of relating to others. They are also barriers, often difficult to overcome, to a correct relationship between man and nature aimed at a more careful reading of the signals that the earth, the known universe, sends us. The book, through the analysis of the author G. Bonura, suggests two directions for reflection. The first invites us to consider how difficult it is, still today, to free ourselves from a dominant culture which, precisely for this reason, does not make us free to be free, to be what we really should be (in the book, the game of cat and mouse) . A correct reading of the signals that the earth and the universe send us has been hindered by an official science that has always had to confront with the different powers to which it has been subjected over time: religious power, political power, economic power. It also reminds us that the important turning point in this way of being "servants of power" occurs when the mouse is the source of information and representation of reality (Galileo Galilei). From that moment on, the man of science, and science itself understood as a cultural discipline, began a long journey of liberation from ancestral preconceptions and prejudices that had hitherto permeated the dominant knowledge and culture. The doors that gave access to true knowledge seemed wide open but the foundations of absolute philosophy remained unscathed. Towards the end of the nineteenth century; early twentieth century scientific rational thought experienced a profound crisis, the scientist cannot find the appropriate concepts and words to express physical reality. It is in this overcoming of barriers that the author stands out: his attitude is no longer that of supremacy, of saying what nature should be but of trying to understand what it really is. Thus, the interest of the scientist frees himself from sectoral, disciplinary knowledge to adopt one that includes everything. The second direction of reflection suggests a model of life which, in practice, is the opposite of the conflictual model suggested by the dominant philosophy. Nature communicates with man through that microscopic (invisible, unreal) world which is the only truly real thing that binds us to it.

This volume explores the integration of recent research on everyday, classroom, and professional scientific thinking. It brings together an international group of researchers to present core findings from each context; discuss connections between contexts, and explore structures; technologies, and environments to facilitate the development and practice of scientific thinking. The chapters focus on: * situations from young children visiting museums, * middle-school students collaborating in classrooms, * undergraduates learning about research methods, and * professional scientists engaged in cutting-edge research. A diverse set of approaches are represented, including sociocultural description of situated cognition, cognitive enthnography, educational design experiments, laboratory studies, and artificial intelligence. This unique mix of work from the three contexts deepens our understanding of each subfield while at the same time broadening our understanding of how each subfield articulates with broader issues of scientific thinking. To provide a common focus for exploring connections between everyday, instructional, and professional scientific thinking, the book uses a "practical implications" subtheme. In particular, each chapter has direct implications for the design of learning environments to facilitate scientific thinking.

How is existing knowledge reconciled with new information in the mind of a young child, as compared to that of a more sophisticated thinker? Development of Scientific Thinking Skills explores a new framework for the conceptualization of changes in the strategies of inductive reasoning from middle childhood to adulthood. Cognitive development Thinking skills Scientific thinking Evidence evaluation Theory Revision

This book explores answers to the fundamental questions driving the research, innovation and practices of the latest revolution in scientific, technological and economic development: how does data science transform existing science, technology, industry, economy, profession and education? How does one remain competitive in the data science field? What is responsible for shaping the mindset and skillset of data scientists? Data Science Thinking paints a comprehensive picture of data science as a new scientific paradigm from the scientific evolution perspective, as data science thinking from the scientific-thinking perspective, as a trans-disciplinary science from the disciplinary perspective, and as a new profession and economy from the business perspective.

Science as Thinking

The Limits of Scientific Reasoning

The Principles of Scientific Thinking

A Miniature Guide for Students and Faculty to Scientific Thinking

The Next Scientific, Technological and Economic Revolution

The Constants and Variables of Inquiry Teaching, Grades 5-10

The book exposes many of the misunderstandings about the scientific method and its application to critical thinking. It argues for a better understanding of the scientific method and for nurturing critical thinking in the community. This knowledge helps the reader to analyze issues more objectively, and warns about the dangers of bias and propaganda. The principles are illustrated by considering several issues that are currently being debated. These include anthropogenic global warming (often loosely referred to as climate change), dangers to preservation of the Great Barrier Reef, and the expansion of the gluten-free food market and genetic engineering.

In this book, Gregory Feist reviews and consolidates the scattered literatures on the psychology of science, then calls for the establishment of the field as a unique discipline. He offers the most comprehensive perspective yet on how science came to be possible in our species and on the important role of psychological forces in an individual's development of scientific interest, talent, and creativity. Without a psychological perspective, Feist argues, we cannot fully understand the development of scientific thinking or scientific genius. The author explores the major subdisciplines within psychology as well as allied areas, including biological neuroscience and developmental, cognitive, personality, and social psychology, to show how each sheds light on how scientific thinking, interest, and talent arise. He assesses which elements of scientific thinking have their origin in evolved mental mechanisms and considers how humans may have developed the highly sophisticated scientific fields we know today. In his fascinating and authoritative book, Feist deals thoughtfully with the mysteries of the human mind and convincingly argues that the creation of the psychology of science as a distinct discipline is essential to deeper understanding of human thought processes.

The Oxford Handbook of Thinking and Reasoning brings together the contributions of many of the leading researchers in thinking and reasoning to create the most comprehensive overview of research on thinking and reasoning that has ever been available.

A concise introduction to the fundamental concepts of social scientific thinking and research, this classic text makes scientific thinking, research methods, and statistics accessible to undergraduates at a commonsense level. This text is intended for use in a broad array of the social sciences, including Political Science, Sociology, and Psychology. Available with InfoTrac Student Collections http://gocengage.com/infotrac. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Scientific Thinking in Speech and Language Therapy

Styles of Scientific Thinking in the European Tradition

Thinking Like a Scientist

Theory and Evidence

Exciting Cross-Curricular Challenges for Foundation Phase, Key Stage One and Key Stage Two

The Contradictions of the Scientific Thinking

Murphy (Christian philosophy, Fuller theological Seminary) argues against the skepticism about Christian belief, and shows how it is similar to scientific reasoning as described by contemporary philosophers of science employing a postmodern, holistic perspective. Annotation copyrighted by Book News, Inc., Portland, OR

Speech and language pathologists, like all professionals who claim to be scientific in their practice, make a public commitment to operate on the basis of knowledge derived in accordance with sound scientific standards. Yet students in communication disorders are given relatively little grounding in the fundamentals of science; indeed, they often receive implicit encouragement to rely on clinical wisdom. This pathbreaking text introduces the principles of critical scientific thinking as they relate to assessing communication problems, deciding about alternative approaches to intervention, and evaluating outcomes. The author provides many illustrative examples to help readers contextualize the ideas. Her clear presentation will help not only undergraduate and graduate students but also established professionals reason more effectively about what they are doing and why. Though the examples come from speech and language pathology, this illuminating and readable book constitutes a valuable resource for all clinical practitioners.

At the turn of the 21st century, the most valuable commodity in society is knowledge--particularly new knowledge that may give a culture, company, or laboratory an adaptive advantage. Knowledge about the cognitive processes that lead to discovery and invention can enhance the probability of making valuable new discoveries and inventions. Such knowledge needs to be made widely available to ensure that no particular interest group "corners the market" on techno-scientific creativity. Knowledge can also facilitate the development of business strategies and social policies based on a genuine understanding of the creative process. Furthermore, through an understanding of principles underlying the cognitive processes related to discovery, educators can utilize these principles to teach students effective problem-solving strategies as part of their education as future scientists. This book takes the reader out onto the cutting edge of research in scientific and technological thinking. The editors advocate a multiple-method approach; chapters include detailed case studies of contemporary and historical practices, experiments, computational simulations, and innovative theoretical analyses. The editors attempt a provocative synthesis of this work at the end. In order to achieve true scientific and technological progress, an understanding of the process by which species are transforming the world is needed. This book makes an important step in that direction by leading to breakthroughs in the understanding of discovery and invention.

Stories give life and substance to scientific methods and provide an inside look at scientists in action. Case studies deepen scientific understanding, sharpen critical-thinking skills, and help students see how science relates to their lives. In Science Stories, Clyde Freeman Herreid, Nancy Schiller, and Ky Herreid have organized case studies into categories such as historical cases, science and the media, and ethics and the scientific process. Each case study comprises a story, classroom discussion questions, teaching notes and background information, objectives, and common misconceptions about the topic, as well as helpful references. College-level educators and high school teachers will find that this compilation of case studies will allow students to make connections between the classroom and everyday life.

Scientific Writing

Critical Thinking, Science, and Pseudoscience

On Interpretation, Explanation and Understanding

The Elements of Social Scientific Thinking

The Need for Critical Thinking and the Scientific Method

Designing for Science

The surprising history of the scientific method—from an evolutionary account of thinking to a simple set of steps—and the rise of psychology in the nineteenth century. The idea of a single scientific method, shared across specialties and teachable to ten-year-olds, is just over a hundred years old. For centuries prior, science had meant a kind of knowledge, made from facts gathered through direct observation or deduced from first principles. But during the nineteenth century, science came to mean something else: a way of thinking. The Scientific Method tells the story of how this approach took hold in laboratories, the field, and eventually classrooms, where science was once taught as a natural process. Henry M. Cowles reveals the intertwined histories of evolution and experiment, from Charles Darwin’s theory of natural selection to John Dewey’s vision for science education. Darwin portrayed nature as akin to a man of science, experimenting through evolution, while his followers turned his theory onto the mind itself. Psychologists reimagined the scientific method as a problem-solving adaptation, a basic feature of cognition that had helped humans prosper. This was how Dewey and other educators taught science at the turn of the twentieth century—but their organic account was not to last. Soon, the scientific method was reimagined as a means of controlling nature, not a product of it. By shedding its roots in evolutionary theory, the scientific method came to seem far less natural, but far more powerful. This book reveals the origin of a fundamental modern concept. Once seen as a natural adaptation, the method soon became a symbol of science’s power over nature, a power that, until recently, has rarely been called into question.

The Limits of Scientific Reasoning was first published in 1984. Minnesota Archive Editions uses digital technology to make long-unavailable books once again accessible, and are published unaltered from the original University of Minnesota Press editions. The study of human judgment and its limitations is essential to an understanding of the processes involved in the acquisition of scientific knowledge. With that end in mind, David Faust has made the first comprehensive attempt to apply recent research on human judgment to the practice of science. Drawing upon the findings of cognitive psychology, Faust maintains that human judgment is far more limited than we have tended to believe and that all individuals - scientists included—have a surprisingly restricted capacity to interpret complex information. Faust's thesis implies that scientists do not perform reasoning tasks, such as theory evaluation, as well as we assume they do, and that there are many judgments the scientist is expected to perform but cannot because of restrictions in cognitive capacity. "This is a very well-written, timely, and important book. It documents and clarifies, in a very scholarly fashion, what sociologists and psychologists of science have been flirting with for several decades—namely, inherent

limitations of scientific judgment," —Michael Mahoney, Pennsylvania State University David Faust is director of psychology at Rhode Island Hospital and a faculty member of the Brown University Medical School. He is co-author of Teaching Moral Reasoning: Theory and Practice.
This miniature guide consists of the essence of scientific thinking concepts and tools. It can be used as a supplement to any science textbook, for any science class. The essence of scientific thinking concepts and tools. It focuses on the intellectual skills inherent in the well cultivated scientific thinker.
You are about to immerse yourself in a gorgeously readable and engaging account of how teachers can move science instruction from “hands on to minds on.” Wendy Ward Hoffer describes how teachers can extrapolate what is known about good thinking strategies instruction to science teaching and learning. Hoffer illuminates the path for thousands of teachers (in science and beyond) who today work with those who will lead this country's efforts in energy, health care, the exploration of sea and space, and the protection of our planet.What work is more vital to our future? - Ellin Oliver Keene Coauthor of Mosaic of Thought, Second Edition This book by an experienced teacher takes professional development to a new level. Many authors of books designed to improve education try to integrate best research with best practice. Few succeed as well as Wendy Hoffer. - J. Myron Atkin Stanford University Inquiry is how we learn about the world. Every day we ask questions, gather evidence, make observations, and draw conclusions. Science as Thinking shows how powerful instruction can connect the natural curiosity students bring to class to the science curriculum. Wendy Ward Hoffer uses the fundamental scientific principles of constants and variables as a framework for highly effective science teaching. She begins with constants, the basics of science instruction: Inquiry, Big Ideas, Workshop, Assessment, Culture. Hoffer shows how building a teaching foundation on these constants ensures that all of your planning, lessons, and interactions spark students' interests and support deep thinking about science. Hoffer's variables are the practices you select from every day - labs, demonstrations, lectures, projects, and other classroom staples. She illustrates how these variables can be carefully manipulated to maximize student engagement, thinking, and understanding. Science as Thinking is a wonderful resource for new teachers, but it will just as soon be sticky-noted and dog-eared by veterans. It helps you: get started and sustain progress with classroom-tested strategies for implementing, teaching, and refining high-quality instruction make direct connections between theory and practice through planning questions conduct meaningful assessment with sample rubrics. If you're as serious about improving students' learning as they are curious about their world, then read Science as Thinking. In it you'll find highly effective and satisfying ways to teach science and turn any science curriculum into the turning point of a young scientist's life.
The Oxford Handbook of Thinking and Reasoning
Based on Critical Thinking Concepts and Principles
Using Scientific Reasoning in the Classroom
Thinking
The Development of Scientific Reasoning
Science Stories

This book examines the learning and development process of students’ scientific thinking skills. Universities should prepare students to be able to make judgements in their working lives based on scientific evidence. However, an understanding of how these thinking skills can be developed is limited. This book introduces a new broad theory of scientific thinking for higher education; in doing so, redefining higher-order thinking abilities as scientific thinking skills. This includes critical thinking and understanding the basics of science, epistemic maturity, research and evidence-based reasoning skills and contextual understanding. The editors and contributors discuss how this concept can be redefined, as well as the challenges educators and students may face when attempting to teach and learn these skills. This edited collection will be of interest to students and scholars of student scientific skills and higher-order thinking abilities.
Contains standards-based activities for the physical sciences that help students learn the scientific method and develop analysis skills that can be applied to science and other subjects.
Scientific thinking must be understood as an activity. The acts of interpretation, representation, and explanation are the cognitive processes by which scientific thinking leads to understanding. The book explores the nature of these processes and describes how scientific thinking can only be grasped from a pragmatic perspective.
This highly practical resource book presents ways in which teachers can help to develop children's problem-solving and thinking skills through a range of exciting science topics. The book contains classroom-based activities which have been trialled and evaluated by teachers and children, and helpfully shows how the skills developed through rigorous scientific investigations can be used across all areas of the curriculum. The scientific curriculum requirements are extended with exciting and inspiring problem-solving activities that use scientific skills, for example: fair-testing pattern-seeking surveying classifying and identifying investigations over time designing testing and adapting an artefact open-ended exploration The book contains learning objectives for each activity, step by step guidelines for carrying out each problem-solving activity, basic equipment that's needed, examples of learner's work and guidelines for assessment. This book is a must-buy for all early years and primary school teachers keen to encourage an inclusive but differentiated approach to the development of problem-solving and thinking skills in their pupils.
The Roles of Domain-Specific and Domain-General Knowledge
Scientific Reasoning and Argumentation
The Emergence and Development of Scientific Thinking during the Early Years: Basic Processes and Supportive Contexts
The Psychology of Science and the Origins of the Scientific Mind
Teaching Problem-Solving and Thinking Skills through Science
How Physics and Scientific Thinking Illuminate the Universe and the Modern World

Telling people about research is just as important as doing it. But many competent researchers are wary of scientific writing, despite its importance for sharpening scientific thinking, advancing their career, obtaining funding for their work and growing the prestige of their institution. This Second Edition of David Lindsay's popular book "Scientific Writing = Thinking in Words" presents a way of thinking about writing that builds on the way good scientists think about research. The simple principles in this book will help you to clarify the objectives of your work and present your results with impact. Fully updated throughout, with practical examples of good and bad writing, an expanded chapter on writing for non-scientists and a new chapter on writing grant applications, this book makes communicating research easier and encourages researchers to write confidently. It is an ideal reference for researchers preparing journal articles, posters, conference presentations, reviews and popular articles; for students preparing theses; and for researchers whose first language is not English.

The term used in the title of this volume--thinking practices--evokes questions that the authors of the chapters within it begin to answer: What are thinking practices? What would schools and other learning settings look like if they were organized for the learning of thinking practices? Are thinking practices general, or do they differ by disciplines? If there are differences, what implications do those differences have for how we organize teaching and learning? How do perspectives on learning, cognition, and culture affect the kinds of learning experiences children and adults have? This volume describes advances that have been made toward answering these questions. These advances involve several agendas, including increasing interdisciplinary communication and collaboration; reconciling research on cognition with research on teaching, learning, and school culture; and strengthening the connections between research and school practice. The term thinking practices is symbolic of a combination of theoretical perspectives that have contributed to the volume editors' understanding of how people learn, how they organize their thinking inside and across disciplines, and how school learning might be better organized. By touring through some of the perspectives on thinking and learning that have evolved into school learning designs, Greeno and Goldman begin to establish a frame for what they are calling thinking practices. This volume is a significant contribution to a topic that they believe will continue to emerge as a coherent body of scientific and educational research and practice.

This volume of the Thinker ' s Guide Library employs critical thinking concepts in the development of productive scientific thought. Readers will learn to reason within the logic of their scientific disciplines and will find their analytical abilities enhanced by the engaging framework of inquiry set forth by Richard Paul and Linda Elder.

Competence in scientific reasoning is one of the most valued outcomes of secondary and higher education. However, there is a need for a deeper understanding of and further research into the roles of domain-general and domain-specific knowledge in such reasoning. This book explores the functions and limitations of domain-general conceptions of reasoning and argumentation, the substantial differences that exist between the disciplines, and the role of domain-specific knowledge and epistemologies. Featuring chapters and commentaries by widely cited experts in the learning sciences, educational psychology, science education, history education, and cognitive science, Scientific Reasoning and Argumentation presents new perspectives on a decades-long debate about the role of domain-specific knowledge and its contribution to the development of more general reasoning abilities.

Data Science Thinking

Light

Psychology in Scientific Thinking

Paradigms for Scientific and Religious Thinking

Higher-Order Thinking, Evidence-Based Reasoning and Research Skills

Scientific Thinking

This volume of the Thinker's Guide Library employs critical thinking concepts in the development of productive scientific thought. Readers will learn to reason within the logic of their scientific disciplines and will find their analytical abilities enhanced by the engaging framework of inquiry set forth by Richard Paul and Linda Elder.

The book is aiming, programmatically, at showing that both in science and religious thinking the basic space-time entity is ultimately built and defined by light. In this sense, the book is emphasizing the unique role of light in understanding the world around us. The approach is based on the belief that science and religion represent two very different modes of addressing reality, both of them being relevant to us as human beings.

The language of science and religion and the answers they each give to the same questions differ due to the elementary postulates on which they are built. A dialogue and debate in the classical sense is, therefore, meaningless. This is why the book has allowed the voice of Physics and the voice of the Philosophy of Religion to be heard in their distinctiveness and nobility. Instead of endless polemics, the work proposes to acknowledge with patience and respect the altera pars approach for the same overarching topics, highlighting the complexity of both domains, and, on a transdisciplinary level, pointing towards the complexity of our mind and reality.

The book is illustrated by Valentin Petridean. The images mirror and enrich the rigorous game of the intellect, illuminating it with sparks of vivid imagination.

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Memories from the past and the need for a new dialogueExperiment versus ExperienceThe Nitty-Gritty of LightThe Nature of LightColours and PerceptionProducing and Absorbing LightThe Speed of Light's PropagationLight and AetherIdeal SpaceTangible SpaceIdeal TimeTangible TimeThe Principle of RelativityThe AftermathChanging Paradigms: 'Memories of the Future'Concluding remarks

"Science has a battle for hearts and minds on its hands….How good it feels to have Lisa Randall's unusual blend of top flight science, clarity, and charm on our side." —Richard Dawkins "Dazzling ideas….Read this book today to understand the science of tomorrow." —Steven Pinker The bestselling author of Warped Passages, one of Time magazine's "100 Most Influential People in the World," and one of Esquire's "75 Most Influential People of the 21st Century," Lisa Randall gives us an exhilarating overview of the latest ideas in physics and offers a rousing defense of the role of science in our lives. Featuring fascinating insights into our scientific future born from the author's provocative conversations with Nate Silver, David Chang, and Scott Derrickson, Knocking on Heaven's Door is eminently readable, one of the most important popular science books of this or any year. It is a necessary volume for all who admire the work of Stephen Hawking, Michio Kaku, Brian Greene, Simon Singh, and Carl Sagan; for anyone curious about the workings and aims of the Large Hadron Collider, the biggest and most expensive machine ever built by mankind; for those who firmly believe in the importance of science and rational thought; and for anyone interested in how the Universe began…and how it might ultimately end.

This unique text for undergraduate courses teaches students to apply critical thinking skills across all academic disciplines by examining popular pseudoscientific claims through a multidisciplinary lens. Rather than merely focusing on critical thinking grounded in philosophy and psychology, the text incorporates the perspectives of biology, physics, medicine, and other disciplines to reinforce different categories of rational explanation. The book is also distinguished by its respectful approach to individuals whose ideas are, according to the authors, deeply flawed. Accessible and engaging, it describes what critical thinking is, why it is important, and how to learn and apply skillsóusing scientific methods--that promote it. The text also examines why critical thinking can be difficult to engage in and explores the psychological and social reasons why people are drawn to and find credence in extraordinary claims. From alien abductions and psychic phenomena to strange creatures and unsupported alternative medical treatments, the text uses examples from a wide range of pseudoscience fields and brings evidence from diverse disciplines to critically examine these erroneous claims. Particularly timely is the text's examination of how, using the narrative of today's "culture wars," religion and culture impact science. The authors focus on how the human brain, rife with natural biases, does not process information in a rational fashion, and the social factors that prevent individuals from gaining an unbiased, critical perspective on information. Authored by a psychologist and a philosopher who have extensive experience teaching and writing on critical thinking and skeptical inquiry, this work will help students to strengthen their skills in reasoning and debate, become intelligent consumers of research, and make well-informed choices as citizens. Key Features: Addresses the foundations of critical thinking and how to apply it through the popular activity of examining pseudoscience Explains why humans are vulnerable to pseudoscientific claims and how critical thinking can overcome fallacies and biases Reinforces critical thinking through multidisciplinary analyses of pseudoscience Examines how religion and culture impact science Enlightens using an engaging, entertaining approach Written by experienced and innovative scholar/educators well known in the skeptic community Features teaching resources including an Instructor's Guide and Powepoint slides

The Scientific Method

Knocking on Heaven's Door

The History of Argument and Explanation Especially in the Mathematical and Biomedical Sciences and Arts

An Evolution of Thinking from Darwin to Dewey

Using Case Studies to Teach Critical Thinking

The Cat-and-mouse Game

Stiles of scient.think.in european tradi./Crombie.-v.3.

Thinking Like a Scientist focuses on high-interest, career-related topics in the elementary curriculum related to science. Students will explore interdisciplinary content, foster creativity, and develop higher order thinking skills with activities aligned to relevant content area standards. Through inquiry-based investigations, students will explore what scientists do, engage in critical thinking, learn about scientific tools and research, and examine careers in scientific fields. Thinking Like a Scientist reflects key emphases of curricula from the Center for Gifted Education at William & Mary, including the development of process skills in various content areas and the enhancement of discipline-specific thinking and habits of mind through hands-on activities. Grade 5

Unlock your mind. From the bestselling authors of Thinking, Fast and Slow; The Black Swan; and Stumbling on Happiness comes a cutting-edge exploration of the mysteries of rational thought, decision-making, intuition, morality, willpower, problem-solving, prediction, forecasting, unconscious behavior, and beyond. Edited by John Brockman, publisher of Edge.org ("The world's smartest website"—The Guardian), Thinking presents original ideas by today's leading psychologists, neuroscientists, and philosophers who are radically expanding our understanding of human thought. Contributors include: Daniel Kahneman on the power (and pitfalls) of human intuition and "unconscious" thinking Daniel Gilbert on desire, prediction, and why getting what we want doesn't always make us happy Nassim Nicholas Taleb on the limitations of statistics in guiding decision-making Vilayanur Ramachandran on the scientific underpinnings of human nature Simon Baron-Cohen on the startling effects of testosterone on the brain Daniel C. Dennett on decoding the architecture of the "normal" human mind Sarah-Jayne Blakemore on mental disorders and the crucial developmental phase of adolescence Jonathan Haidt, Sam Harris, and Roy Baumeister on the science of morality, ethics, and the emerging synthesis of evolutionary and biological thinking Gerd Gigerenzer on rationality and what informs our choices

Scientific Thinking is a practical guide to inductive reasoning—the sort of reasoning that is commonly used in scientific activity, whether such activity is performed by a scientist, a reporter, a political pollster, or any one of us in day-to-day life. The book provides comprehensive coverage of such topics as confirmation, sampling, correlations, causality, hypotheses, and experimental methods. Martin’s writing confounds those who would think that such topics must be dry-as-dust, presenting ideas in a lively and engaging tone and incorporating amusing examples throughout. This book underlines the importance of acquiring good habits of scientific thinking, and helps to instill those habits in the reader. Stimulating questions and exercises are included in each chapter.

Thinking Practices in Mathematics and Science Learning

Why We Can't Trust Our Brains

The New Science of Decision-Making, Problem-Solving, and Prediction in Life and Markets

Implications From Everyday, Classroom, and Professional Settings

The Nature of Scientific Thinking

Lessons That Develop Habits of Mind and Thinking Skills for Young Scientists in Grade 5

In Theory and Evidence Barbara Koslowski brings into sharp focus the ways in which the standard literature both distorts and underestimates the reasoning abilities of ordinary people. She provides the basis for a new research program on a more complete characterization of scientific reasoning, problem solving, and causality. Long acknowledged for her empirical work in the field of cognitive development, Koslowski boldy criticizes many of the currently classic studies and musters a compelling set of arguments, backed by an exhaustive set of experiments carried out during the last decade. Theory and Evidence describes research that looks at the beliefs that people hold about the type of evidence that counts in scientific reasoning and also examines how those beliefs change with age. The primary focus is on the strategies that underlie actual scientific practice: two general sorts of research are reported, one on hypothesis testing and the other on how people deal with evidence that disconfirms a given explanation—the process of hypothesis revision. Koslowski argues that when scientific reasoning is operationally defined so that correct performance consists of focusing on

covariation and ignoring considerations of theory or mechanisms, then subjects are often treated as engaging in flawed reasoning when in fact their reasoning is scientifically legitimate. Neither relying on covariation alone nor relying on theory alone constitutes a formula for success. A Bradford Book. Learning, Development, and Conceptual Change series
Teach your students how to think like scientists. This book shows you practical ways to incorporate science thinking in your classroom using simple "Thinking Tasks" that you can insert into any lesson. What is science thinking and how can you possibly teach and assess it? How is science thinking incorporated into the Next Generation Science Standards (NGSS) and how can it be weaved into your curriculum? This book answers these questions. This practical book provides a clear, research-verified framework for helping students develop scientific thinking as required by the NGSS. Your students will not be memorizing content but will become engaged in the real work scientists do, using critical thinking patterns such as: Recognizing patterns, Inventing new hypotheses based on observations, Separating causes from correlations, Determining relevant variables and isolating them, Testing hypotheses, and Thinking about their own thinking and the relative value of evidence. The book includes a variety of sample classroom activities and rubrics, as well as frameworks for creating your own tools. Designed for the busy teacher, this book also shows you quick and simple ways to add deep science thinking to existing lessons.
Developing Critical Thinking Through Science
Thinking as a Science
The Development of Scientific Thinking Skills
The Thinker's Guide to Scientific Thinking
Redefining Scientific Thinking for Higher Education
Theology in the Age of Scientific Reasoning