



BRUCE JOYCE

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**MODELS** OF  
**TEACHING**

NINTH EDITION

# Models of Teaching

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# Models of Teaching

NINTH EDITION

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**PEARSON**

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To those who hold high the candle that brings new light to education as exemplified by the credo of the Bank Street College of Education, written about 100 years ago by Lucy Sprague Mitchell . . .

What potential in human beings—children, teachers, and ourselves—do we want to develop?

- A zest for living that comes from taking the world with all five senses alert.
- Lively intellectual curiosities that turn the world into an exciting laboratory and keep one ever a learner.
- Flexibility when confronted with change and ability to relinquish patterns that no longer fit the present.
- The courage to work, unafraid and efficiently, in a world of new needs, new problems, and new ideas.
- Gentleness combined with justice in passing judgment on other human beings.
- Sensitivity, not only to the formal rights of the other fellow, but to him as another human being seeking a good life through his own standards.
- A striving to live democratically, in and out of schools, as the best way to advance our concept of democracy

We fervently hope that the models of teaching we open in this book will live up to her manifesto and keep her candle burning.

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# Contents

This book, *Models of Teaching*, is the central component in the multimedia system that supports the study of the major research-based approaches to teaching. However, two other components are very important.

The website [www.modelsofteaching.org](http://www.modelsofteaching.org) provides suggestions on ways of using the book and videos in courses, including online offerings and self-instruction. PowerPoints for each model and a variety of other materials are also available. These materials are designed for both instructors and students, providing support in the design of campus and online courses and for personal study.

The second component is our YouTube channel, which offers video demonstrations of many of the models of teaching, as well as several talks on models and how to learn them: [www.youtube.com/user/BooksendLab](http://www.youtube.com/user/BooksendLab). The site provides access to 25 video demonstrations of a variety of models as well as videos providing tips for learning each model.

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## PART ONE

### **MODELS OF TEACHING: A WORKING PROFESSIONAL REPERTOIRE** **1**

The models are introduced briefly, along with ideas about how to build learning communities in classes and the school as a whole.

#### CHAPTER ONE

### **Where Models of Teaching Come From** *Constructing Knowledge and Skill to Help Our Students Construct Knowledge and Skill* **3**

The product of teacher-researchers comes to us in the form of models of teaching that enable us to construct optimal learning environments for our students. From the time of the academies in Greece and Rome,



teachers have generated innovative approaches to learning and teaching. Succeeding generations have given birth to additional ways of helping students learn. As teachers we can draw on these products and use them to help our students become effective and creative learners.

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#### *Taking Advantage of Our Students’ Capacity to Learn (and Ours)*

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### **THE BASIC INFORMATION-PROCESSING MODELS OF TEACHING**

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How can we and our students best acquire information, organize it, and explain it? Here are several models that are directly aligned with the new curriculum standards—frameworks that embrace teaching students with the methods of the disciplines underlying them.

As we remind ourselves continuously, a major outcome of these models is the development of capacity to learn, to collect and approach information confidently, and to help one another become a community of learners. The tools learned by finding and managing information support the social, personal, and behavioral families. Information-processing models provide academic substance to social models, ways of thinking for personal inquiry, and goals for many of the behavioral models.

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Human beings are born to build concepts. The infant, crawling around, feeling things and bumping into them, observing people’s actions and listening to them, is born to acquire information that is sifted and organized,

building the conceptual structures that guide our lives. The inductive model builds on and enhances the inborn capacity of human beings to organize information about their environments and build and test categories—concepts—that make their world more comprehensible and predictable.

This model is placed first in this part because many other models draw on it, and because when it is combined with others, particularly some social models (e.g., group investigation), student learning can be dramatic.

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## PART THREE

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The models in Part Two can be used for some very broad purposes, including designing lessons, units, courses, and distance offerings. The more specialized models in Part Three, however, are designed specifically to:

- Teach concepts
- Teach students to memorize more effectively, including facts, concepts, and even the core ideas of philosophies

- Teach students to think divergently by learning to use synectics processes to make metaphoric comparisons to break set and learn unfamiliar material better; develop more solutions to problems, and build richer and more productive social relationships
- Design presentations with advance organizers, including lectures, media, and distance offerings
- Teach basic inquiry skills

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Creative thought has often been thought of as something genetically given to a special few, and something that the rest of us cannot aspire to. Not so. Synectics brings to all students the development of metaphoric thinking—the foundation of creative thought. The model continues to improve as we learn more about how to develop analogies to break set, understand better, and solve problems. Importantly, a long-term effect occurs as students learn how to generate fresh ideas and solve problems in their future lives.

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Memorization has had something of a bad name, mostly because of deadly drills and poorly designed textbooks and lectures. However, contemporary research and innovative teachers have created methods that not only improve our efficiency in memorization, but also make the process delightful. The research provides a variety of ways to design

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Learning from presentations has had almost as bad a name as learning by memorization. David Ausubel developed a system for creating lectures and other presentations that will increase learner activity and, subsequently, learning. A scaffold provides a cognitive map of the material for students to organize their study and assess their progress. This is a particularly useful model for the design of distance learning packages. Students can learn to develop scaffolds as a part of their inquiries.

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Working together just might enhance all of us. The social family expands what we can do together and generates the creation of democratic relationships in venues large and small. In addition, the creation of learning communities can enhance the learning of all students dramatically. Interestingly, collaboration among people in different settings is remarkably satisfying, as witnessed in the rise of social media. With respect to collaboration in academic learning, a vast network of systems is fast developing as people interested in particular things find colleagues who share their interests.

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Can two students increase their learning when paired? Yes. Will they develop better social and academic skills if they work together on projects? Yes. Can most students profit from training to collaborate? Yes. Do

collaborative classrooms increase productive study and time on task and decrease unproductive and disruptive behavior? Yes. Are cooperative learning models applicable to K–12 and across curriculum areas? Yes. This chapter looks at some of the basic, easy-to-implement forms of cooperative learning.

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### Group Investigation

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Can students organized into a democratic learning community learn to apply scientific methods to their learning? You bet they can. Group investigation can be used to redesign schools; increase personal, social, and academic learning among all students; and satisfy both learners and teachers. The project method is a recent variant that organizes students to attack specific social problems. The vast resources of the web are putting new wheels under the complex social models. And, online courses do not have to be presentation only or step-by-step drill. They can be designed with vigorous collaborative models, albeit at a distance.

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Values provide the center of our behavior, helping us get direction and understand others. Policy issues involve the understanding of values and the costs and benefits of selecting some solutions rather than others. In these models, values are central. Think for a moment about the issues that face our society right now—research on cells, international peace, including our roles in the Middle East, the battle against AIDS, poverty, and who controls the decisions about pregnancy and abortion, not to mention just getting along together.

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The learner always does the learning. His or her personality interacts with the learning environment. How do we give the learner centrality when we are trying to get that same person to grow and respond to tasks we believe will enhance growth? And how can electronic connections be shaped so that they are not just a matter of arguing online, but reflection and

growth? Oddly, some kinds of distance counseling can be quite helpful. Virtual counseling will be a developing field.

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How do we think about ourselves as learners? As people? How can we organize schooling so that the personalities and emotions of students are taken into account? Let us inquire into the person who is the center of the education process.

Nondirective methods can be supported through distance means. During the school years and later, students can be better connected to their teachers and counselors and supported as they reflect on themselves and take steps to build their self-esteem and ability to relate to others. Much of the support that students need when undertaking investigations involving ICT resources, including online courses and other types of distance courses, can be provided in a nondirective fashion.

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We are what we do. So how do we learn to practice more productive behaviors? This chapter explores some of the possibilities that are variations on themes developed by therapists, particularly Abraham Maslow, Carl Rogers, Erich Fromm, and Karen Horney from the heyday of innovation in psychology.

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For a long time the teaching of comprehension seemed elusive, although reading without much comprehension is not actually reading at all. Then researchers began to study the skills that expert readers use and develop ways of teaching those skills to all students. The resulting model is generally referred to as *explicit strategy instruction*.

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This is the fundamental training model, where new content and skill are introduced, modeled, practiced, and added to the working repertoire. Planning and assessment are the complex parts of the model, but the investment pays off handsomely.

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Why beat around the bush when you can just deal with things directly? Let's go for it! However, finesse is required, and that is what this chapter is all about. The basic model here is derived from social learning theory. Many distance models—a good deal are of the online variety—are direct, but several need better designs and students need to learn how to use learning strategies to get the most out of them.

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Even young children develop learning styles that interact with their environments, including the kinds of teaching they are exposed to. Major

types of learning, like identifying and perfecting new ways of learning, involve some degree of discomfort. Learning new material is a product of the school environment and students need to learn to cope with this discomfort or they will, inevitably, hide from new content. We explain the use of conceptual systems theory to match students to models and scaffold them toward integrating information that advances their growth.

We summarize the growing lines of research and suggest ways that every teacher can add a bit by teaching from an action research perspective, and we discuss and apply Robert Gagné’s marvelous framework for applying research to the task of building curricula.

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Robert Gagné’s framework still guides us as we develop effective curricula. His groundbreaking work combined research on levels and types of learning with the problem of designing instruction that builds on how we think and build knowledge.

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#### *Making Discomfort Productive* **363**

By definition, learning requires knowing, thinking, or doing things we couldn’t do before the learning took place. Curricula and teaching need to be shaped to take us where we haven’t been. The trick is to develop an optimal mismatch so that we are pushed but not overwhelmed. Vygotsky popularized the term *zone of proximal development* to refer to content, conceptual understanding, skills, and processes that are just beyond our current development but not so demanding that we get lost. These concepts are very important because content and process that are well within our comfort zone, while soothing, do not challenge us to grow.

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# Preface

*Models of Teaching* connects educators—new and experienced teachers, school and district administrators, school and literacy coaches, providers of professional development, and college educators—to a storehouse of well-developed and studied ways of teaching. These models have strong rationales, use different lines of research, and provide expected student learning examples. All of them are informed by the experience of the hundreds of educators who have used and refined them. Thus, the models represent a base for professional teaching—*professional* meaning “using research to guide practice.”

Years ago many educators expected that research on teaching would result in a single model that was superior for all types of educational objectives. However, that was not the case when Bruce Joyce began writing *Models of Teaching*, and it is not the case today. Excellent teaching is made up of a repertoire of models that are very good for particular purposes but need to be assembled to generate a top-drawer learning environment for our students. In other words, teaching is not a one-dimensional operation. Rather, teaching reaches toward different students and across disciplines, responsible for a panoply of standards that require corresponding sets of teaching strategies and ways of reaching students.

Even today some policymakers hope that research will boil down the characteristics of effective teaching into a few principles. Though there are, in fact, some things that we all should do as teachers—and other things we should avoid—the kinds of teaching that will make the most difference to our students and give them the skills for lifelong learning are embodied in teaching strategies or models that provide those skills.

Although the comparison of various professions to medicine is somewhat shopworn, there are important parallels here. In medicine, we don't have one antibiotic, one regimen, one type of test. Furthermore, some medical specialties are directed toward prevention as well as treatment. Complicating the assessment of both preventive measures and treatment is that interactions are probabilistic. Obesity is bad for the heart, but some thin people have heart trouble. In education we have models that help students learn how to think more clearly, to organize information better, to feel more confident—but like medical treatments, educational treatments are probabilistic. Education is not

like a game of billiards, where a properly struck ball goes where it is supposed to all the time. In our case, it is *most* of the time.

Over the last 30 years, three important developments have enhanced teaching. One is the continued research on particular models and the development of new ones. Refinements have enhanced their effectiveness. The second is the development of combinations of models into curricula that have great power. Third is the development of electronic technologies that enlarge the library and bring massive amounts of information into the classrooms of even the youngest children. In modern classrooms, hundreds of physical books—fiction and nonfiction—surround the students, and electronic media access to vast resources provides encyclopedias and dictionaries that represent a real advance over print media. The Internet connects modern classrooms to a global network. The study of history is supported by original documents that are easy to access, including graphic material such as the 1,000,000 photos in the Library of Congress collection ([www.loc.gov](http://www.loc.gov)). NASA provides information about space exploration that was available to only a few insiders a dozen years ago. ScienceFriday.com is a delightful site for students and teachers, with simulations available to incorporate into units and courses. Email enables any class to be connected with classes in many of the countries of the world. Young children can follow Jane Goodall's career from her earliest studies to the development of the worldwide organization of children and adults who work together to create a better environment for all living things (including ourselves).

A note on information and communication technology (ICT) promises and worries: Everybody can profit by reading *The Shallows* (Carr, 2010) and *Smarter Than You Think* (Thompson, 2013). Carr lays out the worries that ICT will have seriously negative effects on certain skills and habits. For example, is the use of GPS navigation systems eroding skills in understanding and using maps? Can habitual web-surfing, tweeting, and texting friends generate a goalless, immediate-gratification-oriented state of mind? Or, on balance will the new activities generate new skills and intelligences? This debate will go on for some time.

In our case, we have come from writing manuscript on yellow tablets and typing the result with gallons of corrective fluid on hand. From there, the process evolved to writing and communicating with editors with word processors and graphics files. And at present the print book is also an ebook and is backed up by [www.modelsofteaching.org](http://www.modelsofteaching.org), which brings materials for instructors and students and leads readers to video demonstrations of models, talks providing tips for learning them, PowerPoint tutorials, and more. You don't just write, today, you relearn how to write.

However, as teachers, we need to teach the models of learning that enable our students to understand and exploit the web and use the communication channels to inform themselves and create global connections where interaction with other societies and their cultures becomes the new normal.

The newly developed science frameworks and literacy standards are greatly improved over their predecessors and provide direction for K–12 teaching and learning. Thus, developed models of teaching can become even more effective because support materials, both print and electronic, have become richer.

Yet the field of education is being fiercely criticized at this time in history. Governmental agencies are pressing schools with unprecedented force because current examinations of student learning, particularly the national studies of educational progress, have indicated serious problems. One such problem is that a third or more of our students are not learning to read and write effectively. How can that be, when teaching strategies and learning resources are developing so well?

A major reason is that those powerful models of teaching are unknown to many educators. They need to be known, learned, and used. This book and the resources connected to it can enable new and experienced teachers to broaden their repertoires, develop rich curricula, and enable all students to succeed. All these models work well with students who come to school with limited backgrounds and knowledge of the English language. Our cause is passionate. Education is not only present life; it is also the life of the future. As time passes, all of these models of teaching will be radically changed or replaced by better ones. For now, let us give the students the best that we know.

What students learn today affects their lives in the long term. When we teach our children to read, we are helping them become lifelong readers. When they are learning to work together, they are becoming collaborative citizens of our democracy. When they learn science, they are developing the inquiry skills and habits to educate themselves and solve current and future problems.

Teaching is helping people create themselves. The effects of a teacher's work are still maturing a half-century or more after students' formal education is completed.

## NEW TO THIS EDITION

This edition is enhanced by productive changes in the written prose, the addition of pictures depicting the teaching/learning process in action, and multimedia dimensions where video demonstrations are integrated with the print book.

Multimedia additions include:

- Integrated demonstrations of models of teaching. The demonstrations were captured in classrooms where expert teachers used the models of

teaching with their students. These can be streamed on demand by both instructors and students.

- The website, [www.modelsofteaching.org](http://www.modelsofteaching.org), which extends additional support to learn the models of teaching with PowerPoint presentations, application guides, and video talks.

Text updates include:

- Newly developed analyses of research and applications of the models. Approximately 30 percent of the prose is new to this edition.
- Applications which demonstrate current policy for school improvement. The models in the book are essential to the implementation of the new Common Core State Standards.
- Updates which shape this book into a core text of Professional Learning and School Improvement Initiatives.
- References to lines of research which constitute the field of education can be found within the text and online at [www.modelsofteaching.org](http://www.modelsofteaching.org). The 9th edition provides an extensive guide for graduate study in education.

## ACKNOWLEDGMENTS

Bruce and Emily cannot thank these folks enough.

Lisa Mueller has been a wonderful professional partner. She is a fine provider of professional learning opportunities and demonstrations. We have made videos of her marvelous demonstrations, and they are used in many professional learning programs. Her work has provided inspiration for this edition of *Models of Teaching*.

Brendan Joyce is a great personal companion and has generously given us his technical competence. The site [modelsofteaching.org](http://modelsofteaching.org) contains manuals, peer-coaching guides, bibliographies, and papers on a number of topics related to this text. The site leads to our storehouse of video demonstrations and links. These and our blog, which enables readers to talk with us, are among Brendan's contributions.

Lori Kindrachuk, Ralph Kindrachuk, Marilyn and Walter Hrycauk, Ed Witchen, Jim Jutras, and Kim Newlove have been wonderful companions in the organization of our recent Canadian excursions in school enhancement through professional learning.

Grant Dougall, Sharon Champ, and Mary Bishop are enjoyable friends and colleagues and worked with us to develop videos and other materials. For a sample of Mary's books, take a look at *Tunnels of Time* (2000).

Maureen Bezanson, Jordan Carlson, Tracy Poirier, and Nicole Simon taught us a lot as they studied several models and the Read to Succeed curriculum. They enriched our understanding as we worked with them to introduce several hundred teachers to those innovations.

From Pearson we have had fine support from editors who were given the responsibility for this edition. Both Linda Bishop and Meredith Fossel took over as editors and worked as if *Models of Teaching* were one of their new acquisitions. Janet Domingo has managed the production with knowledge, skill, and good-humored determination. She has a dynamic interface with the helpful Katie Watterson of Electronic Publishing Services Inc. Heather Gauen Hutches, the copyeditor, has been a content and stylistic editor as well as setting up the copy for the compositors. She is a real editor in all senses.

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# *A Note on Heritage*

## **THE FIRST 2000 YEARS**

This is a sketch, really a reminder, that the development of universal public education is a relatively recent event—in fact, one that is not yet complete. Its emergence is built on the work of serious social thinkers and visionaries that shaped the cultural readiness on which equity in the opportunity to learn can be pursued.

The development of formal education depended on the development of language, although long before language developed there was communication—and teaching. Parents, relatives, and tribe members passed down the tools and lore of their culture. Even taboos, such as incest, were enculturated. But with literacy, many aspects of the culture could be written down and passed on more uniformly. Even when most of the citizens were not literate, the written words could be read to them. Scribes wrote down the words of political and religious leaders so that those words became available not only to current citizens but also to subsequent generations.

The development of reading, writing, and some types of formal schooling began long ago, even where only a small portion of society had access to literacy. The Egyptian alphabet dates from about 3500 B.C. Chinese writing included about 2500 characters by around 1200 B.C. Extensive written works in India date from about 800 B.C. Hebrew writing began a few centuries B.C.

The formal literature on Western education dates from the ancient Greek and Roman educators. Some still-useful models have been around for centuries. Plato and Aristotle both developed models of teaching—Socratic dialogue on the one hand and inductive inquiry on the other—that have validity today. Study the literature from their day to the present and you will find a variety of innovative educators who have contributed useful conceptions of teaching and learning. In any given era, there were only a handful of leaders who were able to leave a written heritage, but we have access to them. In their time, their reflections on educational needs in their societies and how to meet



them generated discussions that continue to the present day. Consider just these examples:

- John Amos Comenius (1592–1670) was a Czech religious and educational leader who advocated universal education to provide high qualities of living for individuals and collective knowledge for the improvement of society.
- Jean-Jacques Rousseau (1712–1778) was a French philosopher who also advocated an education to enable all citizens to reach their potential and build a strong base for social improvement. His book *Emile* feels remarkably relevant today, as does writing by his contemporary, Voltaire, whose satirical *Candide* (1759) advanced the development of the novel. Both were influential and productive musicians as well.
- John Locke (1632–1704) was one of a number of important British scientists/philosophers/political activists. He was one of the influential spokesmen for using empirical and logical thinking and scientific methods to seek knowledge and verify ideas. His advocacy of education was closely connected to his beliefs that democratic, rather than authoritarian, processes should make up the social contract and that education for all would underpin democratic behavior and institutions.

In the United States, a number of voices addressed education during the period that led up to independence and the agreement on the Constitution. Benjamin Franklin and Thomas Jefferson represent a small but important group whose talks and writings generated discussions that continue to the present day. Both believed that education should be universal. Jefferson developed a very specific framework where progression through the levels of education would be based on merit. Interestingly, all of the persons we have mentioned thus far came from societies where they had access to education and learning from the most highly educated people of their time—and across national borders. Their belief in a truly democratic society was intertwined with their belief that universal education was an essential condition of democracy. They set forth the arguments for their position along with their beliefs that knowledge should be based on reasoned argument and empirical inquiry rather than on superstition, tradition, or rhetoric. These ideas were the basis for the political action to create the educational system of nations and communities. Finally, in fits and starts, universal education came to life—and actually *is still coming to life*.

The development of a formal educational literature, one that could be taught to educators, began in the 1800s. When the common school in the United States began to develop in earnest—1830 is an approximate birth date—much of public education was dominated by a relatively dour view of childhood. A drill-and-practice mode prevailed, backed up by a “spare the rod and spoil the child” belief in harsh discipline. Much of the early formal writing was in reaction to

unpleasant and inefficient educational practices. Horace Mann (1796–1859) was a powerful advocate for a more positive view and for methods of teaching that would be more consonant with how knowledge is generated and that would incorporate social processes more aligned with life in a democratic society.

The works of Henry James (1842–1910) and John Dewey (1859–1952) provided the base for modern research and development in education. James was a physician and physiologist; he is regarded as the father of psychology as a discipline. Dewey combined ideas from his own work and that of others to form a different vision of education, specifically educating future citizens by organizing learners into collaborative groups that were taught to use scientific inquiry and disciplined discourse as basic tools for learning. These two men represent the beginning of formal inquiry into education, and their works are influential to the present day.

## MODERN EMPIRICAL EDUCATIONAL RESEARCH: BUILDING AND TESTING MODELS OF CURRICULUM AND INSTRUCTION

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By the 1920s, there was a community of researchers in education and philosophy who established educational research as a discipline. By the late 1950s, there were a significant number of researchers and inventors who used empirical methods to validate the curricula and models of teaching they were creating, while the social and behavioral sciences contributed methodologies that enabled the inventors of new models to assess them and make them more effective. Much of our current heritage of approaches to teaching and learning are grounded in rationale and empirical work that has occurred in the last 90 years, although they owe a major debt to prior ideas and inquiries.

Our contemporary storehouse of models is grounded from basic and applied research conducted from the mid-1930s to the present—the modern period of research on education. The sets of studies built around movements to create models of teaching derived from the academic disciplines, particularly the sciences and mathematics, and inductive thinking processes constitute a strong line of work that continues to the present. We selected this line of work because so many models draw on it, although each model has its unique set of inquiries that we will discuss in the chapters introducing them.

Because a considerable amount of research on teaching and curriculum has been connected to the academic disciplines, particularly the biological, physical, and social sciences, we can see bursts of innovative activity and research in terms of three phases of the Academic Reform Movements, in which bringing scientific concepts and processes into education were central. The first phase took place from the late 1950s until about 1985. The second phase occurred between 1985 and 2008 and built on the first movement. We

are entering the third phase now, as the National Research Council (2012), comprised of members from the National Academy of Sciences, the National Academy of Medicine, and the Institute of Medicine, has published its framework for K–12 science standards ([www.nap.edu](http://www.nap.edu)). The National Academy was initiated in the 1860s to make scientific knowledge available to advise policymakers and provide information to the general public. Influential in the first phase of the Academic Reform Movement in education, its descendants are initiating the third phase.

## The First Phase of the Academic Reform Movement

### Studies at the Secondary Level

A set of meta-analyses of more than 300 studies on science curriculum and teaching was coordinated at the University of Colorado (Anderson, Kahl, Glass, Smith, & Malone, 1982). Taking into account that the research on science teaching is complex and studies vary considerably in their objectives and conduct, a persistent focus was on the effect of efforts that are characterized within cooperative/inductive inquiry. Particularly, did students acquire information, build and study data sets, form concepts by organizing and analyzing information in those sets, and engage in investigations (formulate questions, devise methods, and study results)? Put another way, did the students learn academic content and processes for solving problems by studying science content with empirical methods and engaging with the inductive processes that cross curriculum areas?

Ronald D. Anderson (1983), a senior researcher at the Laboratory for Research in Science and Mathematics Education at the University of Colorado in Boulder, summarizes concisely the results of the sets of studies: “Pertinent information from four of the meta-analyses is discussed here and, in general, points to a positive vote for inquiry teaching” (p. 500). Anderson, however, was concerned about the extent that inquiry methods are actually implemented in long-term curricular implementations. He points out that in the Shymansky, Kyle, and Alport (1983) meta-analysis of 105 studies (1000 classrooms with, conservatively, 150,000 students), degrees of use of inquiry methods did not generate differences in effects. However, even in the control groups, *all* of the curricula studied were based on science content and processes, and most of the studies were of six months or more, so differences of degree may not be large.

### Studies at the Elementary Level

In addition to the set of University of Colorado studies, Bredderman (1983) pulled together the studies of the inquiry-oriented, hands-on science curriculum at the elementary level.

Bredderman drew on research on three “activity-based” programs funded through federal resources and assembled by scholars in education, scholars and district consultants in the sciences, and teachers. The three programs varied considerably in structure, with the Elementary Science Study being the most open ended and *Science: A Process Approach* being the most structured. None were structured around textbooks in elementary science. Students acquired data largely through observation and experimentation. Among the three programs, there were 57 controlled studies reported over a five-year period, involving 900 classrooms and, conservatively, about 13,000 students. Two-thirds of the studies involved 10 or more classrooms. Half of the studies were a year or more long, and most lasted two years or longer.

The mean effect size for learning science processes was 0.52. The effect size for scientific content was 0.16. Attitude toward science and process was 0.28. Smaller subsets examined effects on creativity (0.42) and measures of intelligence (0.48). Computation and mathematical understanding increased modestly. The aggregated mean effect size was 0.30.

The idea that curriculums should aim at ideas, inductive and other scientific processes, and intellectual capacity and creativity is quite different from the position that the fundamental purpose of education is to imbue students with basic information and skills. One of the often-heard reactions to the activity-based programs has been that they put too much stress on science process at the expense of content learning. However, when activity-based programs are compared with traditional science programs on standardized achievement tests, it appears that those fears have been unwarranted. Content achievement was not affected in a negative way. This was true even if only a subgroup of studies that compared textbook programs with activity programs was considered. (p. 512)

## **The Second Phase of the Academic Reform Movement**

Over the next 20 years, research on inquiry teaching continued, and in 2010 Minner, Levy, and Century presented a synthesis that covered 138 studies from 1984 to 2002. Nearly 2000 classrooms and about 40,000 students were involved.

Like Anderson 27 years before them, Minner, Levy, and Century are able to make a definitive statement about the effectiveness of the inquiry-based science curriculum during what we characterize as the second phase of the Academic Reform Movement.

Findings . . . indicate a clear, positive trend favoring inquiry-based instructional practices, particularly instruction that emphasizes students’ active thinking and drawing conclusions from data. Teaching strategies that actively engage

students in the learning process through scientific investigations are more likely to increase conceptual understanding than are strategies that rely on more passive techniques. (p. 474)

Generally speaking, the results from the Minner, Levy, and Century synthesis are somewhat larger than the results from the studies associated with the Academic Reform Movement. Probably this is a result of the increased refinements in curriculum and instruction—and we can expect more.

### **The Third Phase of the Academic Reform Movement: Just Beginning**

The National Academy of Science's *Framework for K–12 Science Education: Practices, Concepts, and Core Ideas* (National Research Council, 2012) provides the conceptual foundation for the next core curriculum in science and will generate a third phase of the Academic Reform Movement. The inclusion of engineering and technological content should enhance content and process significantly. From the 40 years of studies drawn on previously, we can predict that not only the teaching/learning process will be upgraded, but that student learning will also rise to new levels.

The authors of the framework recommend even more powerful curricula than their predecessors. The development of hybrid curricula that draw on ICT and the increased use of interactive electronic media in and out of school should increase the use of investigation as part of the curriculum. There is now ample evidence that the success of ICT in education will depend on the models of teaching and learning that are implemented.

# *Models of Teaching: A Working Professional Repertoire*

Chapter 1 opens our inquiry. We examine the concept of models of teaching and learning and how the models in this book were selected. We begin to study where models have come from—from gifted teacher-innovators is the short answer—and we prepare to acquire these interesting and effective tools. In Chapter 2, we delve into the social aspects of learning, for effective teaching involves the development of communities of learners and equipping students with ways of learning that will enable them to have high quality lives in school and beyond.

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# Where Models of Teaching Come From

## Constructing Knowledge and Skill to Help Our Students Construct Knowledge and Skill

*Helping new teachers learn to help students learn is more than worthwhile. It's transporting. The satisfaction when the veil lifts and someone realizes that the only barriers to growth are imaginary and self-imposed is almost unbearable. It's like watching the birth of a species.*

—Fritz Perls to Bruce Joyce

### ORGANIZING IDEA

Effective teaching is made up of a toolkit of ways to reach students and help them build their reservoir of knowledge, skills, and enduring values.

### SCENARIO

#### A DAY IN THE LIFE OF SECTION 3A IN SIMONS ELEMENTARY SCHOOL

**8:30.** Traci Poirier's third-grade students assemble and find their places in the big horseshoe where their desks are arranged. This week they are organized in groups of three. The members of each group discuss something they have done or thought about since leaving class yesterday. Some share books they have read, films or television programs they have seen, places they have gone, or conversations with their family. All are responsible for sharing some current news event.

**8:45.** Traci asks whether any students wish to share an item that was shared with them. Nancy shares that Billy had received an email from his pen pal at Taipei Market School in Hong Kong (their recently adopted class, which uses them to



study life in the United States as they study life in Hong Kong). Billy's pen pal has wondered how many brothers and sisters they have. Everyone writes down his or her number of siblings and passes it to Billy so he can reply. Andy shares that Sharon reported that her sister was getting married on Saturday and wonders whether the class could send her a "best wishes" card. They agree to do so, and Andy volunteers to make a card to send to them.

**9:00.** The class begins their literacy study. The first inquiry is to get information from a picture of downtown Taipei Market. The class members take turns identifying items in the picture. Traci draws lines from the items to chart paper that surrounds the picture and writes and spells the words, and Andy enters them into the computer. Later they will be printed out on cards for each member of the class. About 30 items are identified and 12 questions generated.

The words are then compared with a set of items they have generated from a picture of the downtown area in their town. To their amazement, about 20 words from each picture are the same. There are more common attributes than different ones. Only six items in the Taipei Market picture are unfamiliar to them. Some of the items are similar, although their representations may be different (a sign in Chinese and English contrasts with a sign only in English). Traci agrees to circle them on the digital picture and email it to the Hong Kong class for identification.

**9:30.** The class does independent reading. For most students this means reading information from websites that Traci has bookmarked for them and looking through the encyclopedias for information about Hong Kong, taking notes, responding to questions, and developing new questions to explore. Traci tests two students using the Gray Oral Reading Test, looking for fluency and comprehension and searching for clues for her next sessions on comprehension skills for all the students.

**10:00.** The class works on writing, comparing the two downtown areas using the words they have identified to describe the two pictures. Traci models opening sentences for them, concentrating on how titles and first lines work together to establish topic and theme. She picks up on a prior session where the students classified opening sentences in trade books. Tomorrow they will continue to gather and discuss information as they compare Hong Kong to their own locale, and they will use synectics (see Chapter 7) to explore analogies to structure their writing.

It's only 10:30, but Traci has already designed activities using cooperative learning strategies, the picture word inductive model, group investigation, and the inductive model, and has planned a follow-up lesson using synectics. As the day progresses, she will begin a unit on plants in their vicinity, using the scientific

inquiry model (Chapter 4), and continue a unit where the properties of number systems are the focus.

Traci has a good-sized repertoire of models of teaching. She knows that success for the students depends on their mastery of the models of learning that are embedded in each model of teaching.

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The classic definition of teaching is *creating environments to facilitate learning*. A model of teaching is a way of building a nurturant and stimulating ecosystem within which the students learn by interacting with its components. Various models pull students into particular types of content (knowledge, values, skills) and increase their competence to grow in the personal, social, and academic domains. We use models in many ways, ranging from planning and using lessons, units, and curricula, to designing instructional materials, including multimedia programs. This concept replaces the “gas station” image of education, where students drop by to be loaded with cognitive fuel. That rather obsolete picture of teaching emphasizes the time-honored picture of a person *imparting* knowledge or skill by talking, exhorting, and drilling students—taking them through their paces in a grinding fashion. Happily, there are models for designing and delivering good lectures, motivating students, and carrying out effective training. There are times when we need to use the traditional delivery or transmission modes, but when we do, we should use the best models available for designing learning experiences and always be aware of the purposes that any approach can and cannot fulfill.

The last few decades have generated an enormous number of ways to enhance learning environments that existed only in dreams when we were writing the first edition of *Models of Teaching*. Even then we were using film, video recording and playback, simulations, transparencies, a dozen or so models of teaching, and a variety of other technologies both in our school and our teacher education programs. Those media are still important, but some are still underused in schools and universities. The best models of teaching in the earlier era are still effective today, along with some new ones, and all are enhanced by information and communications technology (ICT) and the available digital education tools.

## OUR PERSONAL AND PROFESSIONAL HERITAGE

We have been fortunate enough to study with many contemporary educators who have developed and tested a variety of approaches to education and have developed the literature from the 1960s to the present. You will meet some of these shortly. We visit schools and classrooms and study current research on teaching and learning. We also study teaching in settings other

than K–12 schools, such as therapies and training in industrial, military, and athletic settings.

We have found models of teaching in abundance. Some have broad applications, whereas others are designed for specific purposes. They range from simple, direct procedures that yield immediate results to complex strategies that students acquire gradually from patient and skillful instruction.

For *Models of Teaching*, we selected models that constitute a basic repertoire for schooling. With these models we can accomplish most of the common goals of schools—and at a high standard. In any school, students can achieve many goals that only outstanding students in outstanding schools once aspired to achieve. Using models in combination, we can design schools, curricula, units, and lessons. The selection includes many, but not all, of the major philosophical and psychological orientations toward teaching and learning. All have a solid theoretical basis—that is, their creators provide us with a rationale that explains why we expect them to achieve the goals for which they were designed. The selected models also have histories of extensive practice behind them: They have been refined through experience so that they can be used comfortably and efficiently in classrooms and other educational settings. Furthermore, they are adaptable to the learning styles of students and to the requirements of many curriculum areas. Education comes to the new core curriculum standards with a well-stocked storehouse of effective models that address the most demanding standards.

In addition to being validated by experience, all are backed by formal research and disciplined action research that tests their theories and their abilities to yield positive effects. The amount of related research varies from model to model. Some are backed by a few studies; others have hundreds of items of research. As we discuss each model, we provide key references and links—ones that provide access to the research literature and will include page-long descriptions of some of the more revealing studies. They were designed to have positive effects on student learning, and we try to make the warrants (evidence and reasoned analysis) under their stated effects as transparent as possible.

## COMMON CHARACTERISTICS ACROSS ALL MODELS

Before introducing the models and the families into which we have grouped them, we need to discuss some of the characteristics that all of the selected models share. Learning is the reason for all models, but other attributes are common and integral to the teaching stances represented by the models.

### Helping Students Learn How to Learn

In their own fashions, each of the selected models includes helping students increase their repertoire of strategies for learning. While using any model, teachers study how the students learn and help them expand their capacity to do so.

- **Helping students take responsibility for learning and supporting their efforts.** Even when being highly directive, which can be the case while introducing students to new ways of learning, we emphasize that they need to build the capacity to take increasing responsibility for their learning. We move from a need to provide extensive coaching to students to a situation where students are coaching themselves.

- **Helping students reach toward new knowledge, skills, and self-understanding.** The essence of learning, in school and out, is acquiring new cognitions, abilities, and even emotions and values. A major part of teaching is helping students learn to go beyond where they are. When a six-year-old says, “I don’t like to read!” the underlying emotion is that the child wants to avoid the labor of learning to read and, possibly, the feeling of embarrassment while overcoming difficulties in learning.

## A Constructivist Orientation

In their own fashions, all these models seek to help students build knowledge, skills, and values. The instructional aims of several models are almost purely constructivist with respect to academic content (see Vygotsky, 1962). For example, inductive inquiry (Chapter 3) designs the environment so that the student *constructs* categories, tests them, and from them generates inferences and hypotheses, leading to more testing. A very different model, nondirective teaching (Chapter 14), is designed to help students understand themselves better—to *construct* self-knowledge—and set goals in the personal, social, and academic domains.

## Scaffolding the Learning Process

Built into their processes, all the selected models provide avenues for teachers to “boost” students over difficulties and into the next levels of learning. Vygotsky described the process as seeking the “zone of proximal development” where learning tasks are at a level slightly above the student’s zone of complete comfort, but not so far above that the student cannot manage. Conceptual systems theorists, including the present authors, describe this as providing an “optimal mismatch” designed to enable students to pull themselves into ever-higher levels of capability (see Chapter 20). For example, when teaching new skills with the “training” models (as in Chapter 18), a skill is explained and demonstrated and then the student has to try the skill. At that point, if a student shies away, scaffolding in the form of encouragement may be enough to lift them to try. Possibly more explanation or another demonstration may be in order, but providing motivation may be the difference between success and discouragement. Scaffolding by a teacher on the campus can be a critical support when a student is engaged in distance learning, such as taking part or all of a

course online. More than ever, students need to learn to profit from distance offerings. Even those who are highly skilled at downloading and learning to play games may need help when downloading large quantities of information.

### **Formative Assessment and Adjustments**

Closely related to scaffolding is the use of formative assessment to determine whether more or a different kind of support is needed. Sometimes switching to a different model of teaching can help a student find an avenue to learning. ICT is an increasingly important resource for classes as a whole, as well as providing acceleration for students who are sprinting ahead and tutoring for those who need extra help along the way. Helping students become aware of their progress and needs is a critical component of formative assessment. Parents are also brought into the process when they can help, which is frequently.

All models of teaching provide the opportunity for teachers and students to study progress, continue things that are working well, and make adjustments by adding processes and replacing ones that are not working.

### **21st-Century Skills**

A strong movement to improve education has emphasized what have been termed *21st-century skills*—types of expertise that have come to the fore as the global, digital world has emerged. Probably “areas of needed knowledge and competence” is a more accurate and useful term than “skill,” but expertise is certainly found in them (see Kay, 2010; Joyce & Calhoun, 2012).

Some 21st-century skills are versions of competence that have been around for a while. Some have been emphasized in the new core state standards, and some are emerging as the digital age ripens. They are *not* just a collection of computer or ICT skills. Though ICT literacy is important, the vital skills are cognitive: learning to inquire, to build and test ideas, to categorize, to summarize. These have been with us a long time, and they continue to be essential as the opportunities to use them expand. However, everyone needs the skills to use software for word processing, graphics, photo and video editing, searching the web, and locating and using distance instructional offerings. For teachers, mastery of interactive whiteboard technology is increasingly important. Let’s look at some of the other areas that are emphasized by the 21st-century movement.

### **Cultural Literacy and Global Awareness**

One of the most striking characteristics of the ICT explosion is the rise of a global, cross-national culture and its effects on relations near and far. These effects change the nature of our society, increase interdependence, and generate a considerable need for intercultural understanding. The implications are apparent as nations and their well-being have become more interdependent,

economies more unified; and we as individuals are in contact with, well, almost everyone. A provincial perspective today can have devastating consequences.

## Collaborative and Cooperative Skills

We need each other. We always have, but the price of failure to work with others near and far has become unsustainable. Schools need to develop a rich culture to teach students to work and play together. In fact, the campus will be a very important place in the future because it is the major social laboratory for the young. As they reach out into cyberspace and information and ideas zip back from global sites, students need each other for perspective. The simpler cooperative learning models must pervade the school, and the most complex models—cooperative/inquiry models and group investigation—should propel major inquiries. Social media have enormous implications and are affecting life all over the world.

We urge teachers to join the International Association for the Study of Cooperation in Education. We greatly enjoy and learn from their newsletter.

## Creativity

Convergent thinking enables students to focus on and drive for mastery of knowledge and skills from outside. Divergent thinking plays with information, concepts, pictures, sounds, and objects. Things are moved around, and surprises appear. The process is what the great Bill Gordon called *serious playfulness*, an oxymoron that captures the essence of metaphoric thinking. Ideas that were born on different cognitive planes are placed next to each other, on top of each other, inside each other. Environments populated with analogies lure students into a divergent state. Conception occurs.

The selected models in this book share these characteristics and goals.

## THE FAMILIES OF MODELS

We have grouped the models of teaching into four families whose members share orientations toward human beings and how they learn. These are:

- The Information-Processing Family
- The Social Family
- The Personal Family
- The Behavioral Systems Family

We turn now to these four families, what they emphasize, and the models and the people who invented them, studied them, and advocated for them. As you read, keep in mind that, as a teacher, you can begin with a few that have wide applicability and then add others to reach particular goals more readily.