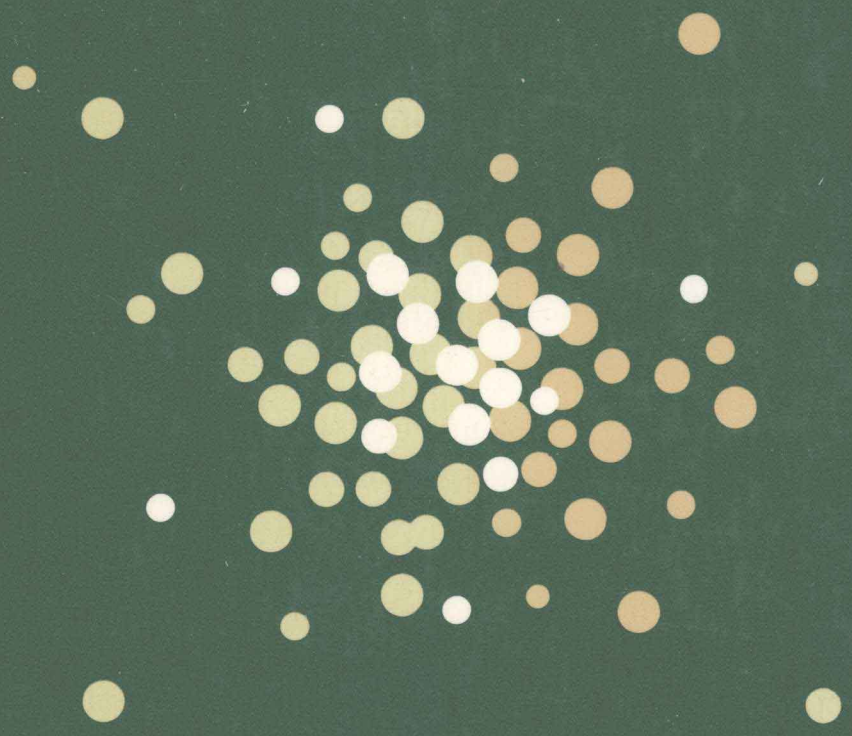
# TEACHING THINKING SKILLS: A HANDBOOK FOR SECONDARY SCHOOL TEACHERS



BARRY K. BEYER

# Teaching Thinking Skills
## A Handbook for Secondary School Teachers

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For
KURT RAYMOND BEYER

May he, his sister, cousins, friends, and contemporaries
be the ultimate beneficiaries of these pages.

# Foreword

While the goal of developing the thinking abilities of students is certainly not new, renewed attention is being directed toward accomplishing this educational objective. This focus has been stimulated, in part, by the results of national and state assessments of student achievement, which reveal disappointing performances on those tasks, such as inferential reading, persuasive writing, and multistep problem solving, requiring the thoughtful application of knowledge and skills. These results are confirmed by university reports stating that large numbers of entering students are inadequately prepared for the complex thinking required in higher education. Nearly all of the educational reform reports issued during the 1980s have cited these poor performances, along with such factors as the rapidly changing nature of modern society, the "information explosion," the challenges of global economic competition, and the needs of a democratic society, in their recommendations for an increased emphasis on the development of student thinking abilities.

Although the "call to arms" is widely heard, secondary teachers interested in responding are often hard pressed to find practical solutions to the problem of integrating the teaching of thinking within content area instruction. The challenge is complicated by the recognition that sophisticated thinking may not develop automatically as a by-product of "teaching the subject well." In fact, the traditional means for stimulating students to think about content may be inadequate. For example, simply asking higher-order questions does not ensure that students will possess the necessary knowledge and thinking abilities to answer them. Merely holding a classroom debate does not teach students how to structure an effective argument or assume a devil's advocate position. Likewise, the assignment of a problem or a writing assignment does not, by itself, explicate the strategies employed by capable writers or problem solvers. In each of these cases, a more explicit approach to the development of thinking may be needed.

Unfortunately, the traditional source of curriculum and instructional support for secondary teachers, the textbook, is generally deficient in providing the needed assistance. Few current textbooks provide substantive guidance to teachers interested in the explicit teaching of thinking skills and processes within the content areas. Although a growing number of thinking skills workbooks are now available, their "content-free" exercises rarely address the unique thinking demands of secondary subject areas. Given the present state of affairs, *Teaching Thinking Skills: A Handbook for Secondary School Teachers* provides a uniquely practical guide for infusing the teaching of thinking explicitly into the various content areas. In an extremely clear and comprehensive fashion, Barry Beyer addresses and assists practitioners in working out their answers to the major questions faced by teachers: *What are the key thinking skills I should—or could—teach? How can I effectively teach thinking in a way that supports the achievement of content objectives? What are the steps and strategies involved in the various thinking skills and processes? In what ways might I promote transfer? How do I create*

*a classroom climate to support the development of thinking? How do I assess the growth of my students' thinking?*

The recommended procedures presented here by which teachers can identify, describe, teach, and assess the relevant thinking skills within their subject areas are among the most detailed and complete available. Through the use of illustrative examples and sets of teacher-developed lessons, the teaching of thinking is "brought to life." One cannot read these in-depth lesson descriptions without learning something new about the nature of the thinking skills being taught and about effective ways to teach them. The accompanying teacher reflections, while acknowledging the uncomfortable feelings associated with instructional innovation, reassure the reader that the teaching of thinking *is* important and *can* be done.

The explicit teaching of thinking skills as a part of content area instruction is still in its infancy. With relatively few models to follow, secondary teachers committed to teaching thinking will appreciate the support provided by this handbook. Its use will promote reflective teaching, a thoughtful approach to subject matter, and more meaningful learning for students.

Jay McTighe

# Preface

One way to help people become better, more effective thinkers is to help them become proficient in carrying out the skilled operations of which effective thinking, in part, consists. To do this, of course, requires considerable knowledge about the nature of thinking and of thinking skills. It also requires mastery of certain basic teaching skills and strategies.

Thinking and thinking skills are not synonymous. *Thinking* is the mental manipulation of sensory input and recalled perceptions (information and thoughts stored in memory) to make or find meaning—to reason about or with, to formulate thoughts, and to judge. We think for many reasons, including to resolve problems; to comprehend; to judge worth, sufficiency, or accuracy; to make decisions; and to conceptualize. These are complex, complicated mental activities that consist of multilevel processing and simultaneous, often recursive, use of a multitude of skilled operations as well as considerable knowledge and information.

*Thinking skills,* on the other hand, are the discrete, precisely delineated mental operations used in varying combinations as we think. Dozens upon dozens of such skills have been identified, such as remembering, distinguishing the relevant from the irrelevant, classifying, predicting, judging the strength of a claim, synthesizing, inferring relationships, and making conclusions. These and similar skills are the building blocks, or tools, of effective thinking. They are used over and over again in changing combinations to carry out any major thinking task, strategy, or process involving the production of meaning, insight, or knowledge.

If you wish to help students—or individuals of any age for that matter—to improve their thinking, you can do so by deliberately and continuously teaching them how to sharpen their expertise at executing the thinking operations most commonly used in thinking. Initially this means focusing attention and efforts on helping them master individual thinking skills.* Eventually, however, it means helping your students integrate these individual skills into smoothly functioning procedures of a highly complex nature to a point where your students can execute them in rapid, accurate, expert manner on their own initiative in a variety of contexts.

My experience at teaching thinking and helping others learn how to do so indicates that to teach thinking skills most effectively, you must be able to do at least four things well:

1. *Identify the attributes (features, ingredients, components) of the thinking skills that you seek to teach.*

*To minimize confusion, I use the term *thinking skills* throughout this handbook to include *all* classes of cognitive operations, including those also commonly identified as strategies and processes.

To teach any thinking skill well, you must know and understand its major attributes—the (a) procedure(s), (b) rules, and (c) criteria or other knowledge employed to carry it out. But for many of us, knowledge of these attributes of most thinking skills remains quite elusive. Not only is this knowledge often unclear to us, but it is rarely found already packaged for us to read and understand. Rather, we often have to identify skill attributes for ourselves. Being able to teach thinking skills requires, first and foremost, skill at finding out what these attributes are for any cognitive skill you might choose or be expected to teach.

2. *Plan and conduct lessons to help inexpert thinkers learn how to carry out these thinking skills effectively.*

   Teaching thinking skills involves more than simply making students think or think harder. It involves purposeful, instructive mediation, or intervention, to help them become conscious of how they think and to sharpen the cognitive skills they employ in thinking. Such mediation includes explaining, modeling, cuing, and guiding practice in how these skills can be carried out, as well as helping learners apply and bridge these skills in a variety of combinations, for a variety of purposes, to a variety of contexts. It also involves helping students consciously think about how they think and purposefully plan and direct their own thinking. To do these things well, you must be skilled at planning and carrying out, on a continuing basis, lessons using instructional strategies and techniques that are well-suited to these purposes.

3. *Assess student proficiency in the thinking skill(s) being taught.*

   In order to improve your own teaching, as well as to evaluate student learning of the thinking skill(s) you wish to teach, you must be able to identify and use valid, reliable thinking skill assessment instruments and procedures and to construct your own. Assessing student thinking directly is an integral part of teaching thinking skills. The results can be used to improve your own teaching, motivate student learning, and make summative judgments about the quality of your teaching and of student achievement.

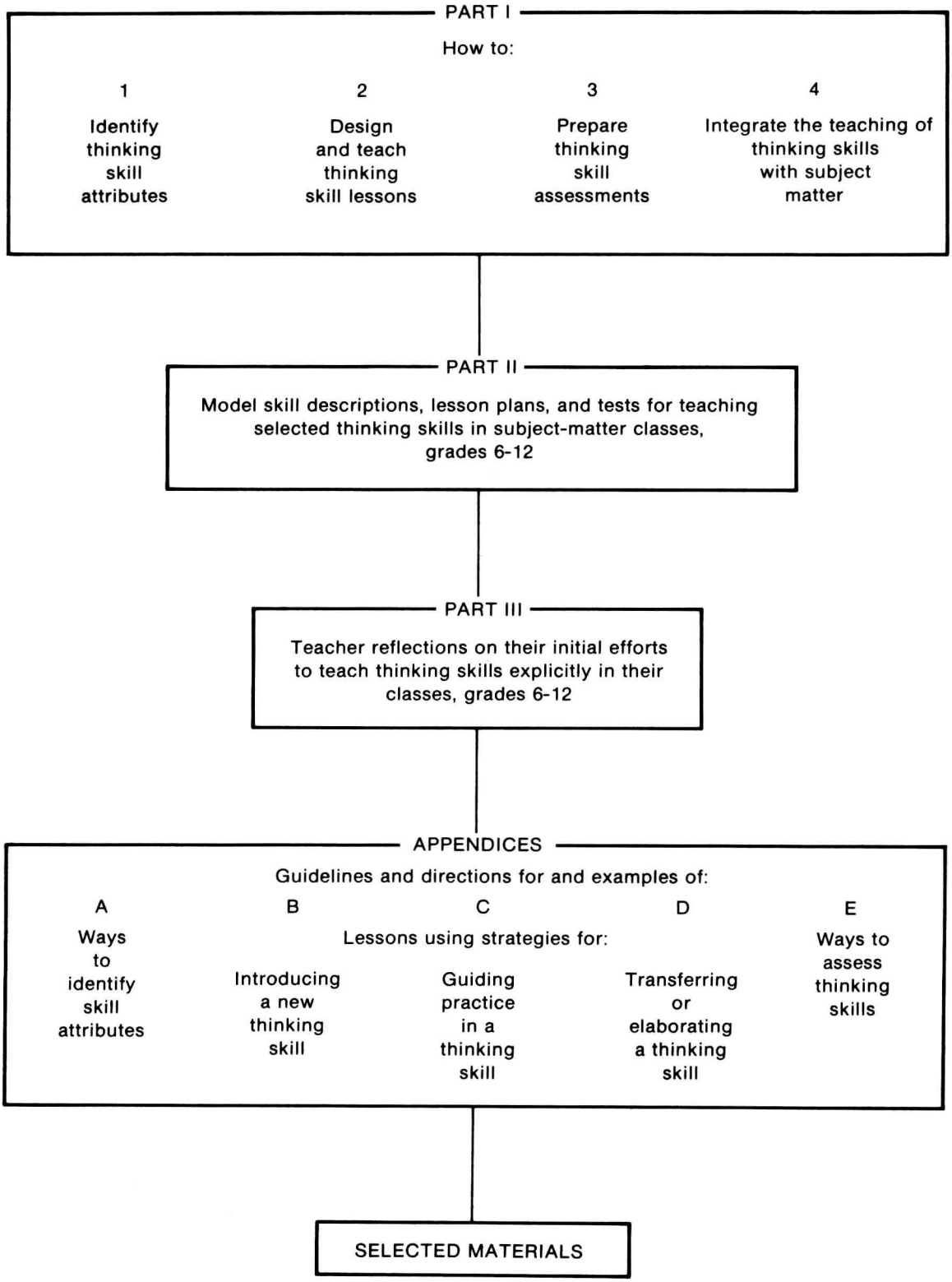
4. *Infuse, or integrate, the teaching of thinking skills in existing subject-matter units, classes, or courses.*

   Students seem better motivated to learn a cognitive skill when instruction in that skill is provided at a time they feel a need to know how to do it better than they can at the moment. What better time or place to teach thinking skills, then, than in the subjects where students need these skills to achieve the learning objectives that have been established! In fact, unless students are helped to apply these skills in different subjects, it is unlikely they will be able to do so very well on their own. To maximize the learning of thinking skills *and* the academic achievement of your students, you must be able to integrate the teaching of these skills into the subjects your students study.

It is the goal of this handbook to assist you in learning how to carry out these four teaching skills or in improving your abilities to do so.

To accomplish this goal the pages that follow present four kinds of information. The accompanying figure outlines these in the context of the contents of the entire handbook. Part I presents step-by-step procedures and activities that will enable you to learn how to identify the attributes of any thinking skill you wish to teach (Chapter 1); how to construct and teach lessons employing strate-

Contents and Structure of *Teaching Thinking Skills: A Handbook for Secondary School Teachers*



gies appropriate to the teaching of any thinking skill in any subject area (Chapter 2); how to construct and conduct any of several different kinds of thinking skill assessments (Chapter 3); and how to integrate the teaching of thinking skills into your existing subject matter units, classes, or courses (Chapter 4). These procedures and activities are precisely those I would guide you through if you and I were working together on a one-to-one basis, or in a college course, or in a continuing inservice workshop dealing with the teaching of thinking skills. Upon completing this part of the handbook, you should be able to carry out these teaching skills on your own with some degree of proficiency.

The procedures presented in Part I have been used repeatedly—and refined extensively—over the past half-dozen years or so to help teachers become more skillful at teaching thinking skills. These procedures are derived from research in training, skill acquisition, and adult learning, and they apply teaching strategies generated by such research. Obviously, not everything you need to do to master the teaching skills taught herein can be included in these pages—the practice, coaching, revision, and continued application so critical to developing expertise in any skill are things you must continue to do once you have completed this handbook. However, the guidelines and procedures presented here will help you through the initial steps in learning how to carry out each of the four tasks so essential to the effective teaching of thinking skills noted above.

Part I of the handbook is not designed to be read through in a single sitting as you might do with an ordinary text. Rather, because it consists essentially of learning procedures and activities for you to use to develop the teaching skills noted above, you should read it and carry out the procedures presented a bit at a time. To assist you in doing this, I have divided it into convenient learning segments. Each segment consists of a major learning or planning task designed to help you to produce or understand something. Each concludes with an easily identified checkpoint. These checkpoints signal the end of a particular learning sequence and mark places where you can stop, sit back, reflect on and discuss with those of your colleagues who may also be using this handbook what you have learned or developed during your study of the segment just completed. Not all segments require equal time to complete. Some will require less than half an hour, whereas others will require a number of hours of reading, writing, practicing, reflecting, sharing, and revising, sometimes spread over several days or weeks. However, each segment comes to a close with a checkpoint where you can sum up what you have learned, done, or produced. Then, when you are ready, you can move on to the next segment.

The activities and procedures in Part I incorporate the principles of both collaborative learning and peer coaching. In learning how to teach thinking, two or more heads are usually better than one. The activities included here provide opportunities and guidance for such interaction and collaboration. Moreover, through these pages I have tried to do what a real coach would do to help you master the teaching skills and knowledge you will need to be a successful teacher of thinking skills in your classroom. Part I provides for explanation, demonstration, application, and practice of the teaching skills you choose to learn, as well as opportunities and procedures for receiving feedback on how you carry out these skills or complete these tasks when you try them. By the time you and your colleagues complete this handbook, you should have engaged in the kinds of activities and formed the kind of relationships that will enable you to continue on your own the kind of supportive, collaborative coaching relationship and activities so useful to improving teaching and so instrumental in successful efforts at improving the learning of youngsters in our schools.

Part I also provides numerous opportunities for you to reflect on how you think and how you carry out important teaching tasks. Research by Benjamin

Bloom, Ann Brown, Arthur Whimbey, J. H. Flavell, and others indicates that effective thinkers think about how they think before, during, and even after carrying out a cognitive task. This thinking about one's own thinking is referred to by experts as *metacognition.* Metacognitive thinking directs and controls the thinking we use to solve problems, make meaning, choose, and so on.

By reflecting on how you think, you raise your thinking to a level of consciousness where you can become acutely aware of what you are doing and how it works for you. As a result, you can deliberately and carefully dissect, redirect, modify, and improve how you carry out your thinking and take deliberate control of it. Consequently, as your thinking becomes more automatic and less conscious, it functions more smoothly and effectively. Thinking about how you do things—whether planning, teaching, testing, or thinking—helps you to understand these operations better and to take ownership of them. It is a higher-order cognitive activity and typifies experts in any field.

Part II of this handbook provides descriptions, lesson plans, and tests for selected thinking skills commonly taught in different subjects at different grade levels, 6–12. These skill-teaching materials have been prepared, reviewed, and used by teachers or teachers-to-be as they proceeded through activities and procedures like those presented in Part I of this handbook to learn specific strategies for teaching thinking skills. You can refer to these packets as you proceed through Part I for illustrations of these teaching strategies, but you may use them in other ways as well. For example, you may use these sample materials as models for similar materials you may wish to produce for teaching different skills of your choice to your students. Or, you may actually use these materials to teach these particular skills in your own classroom.

In Part III you will find essays by some of the authors of the skill packets in Part II as well as by other teachers or individuals training to be teachers, reflecting on their initial experiences in using various strategies for teaching thinking skills. In these brief accounts, these teachers tell how they felt in using new skill-teaching strategies for the first time, what worked and what didn't, and what they learned as a result of their teaching. By sharing their experiences with you, they hope to encourage you to feel more at ease with what you are learning. These accounts may also help you understand that everyone who tries something new experiences many of the same doubts, frustrations, and feelings that you may experience as you proceed to apply and try out teaching skills that may be new to you.

Finally, the Appendices present excerpts from my *Practical Strategies for the Teaching of Thinking* (Allyn and Bacon, 1987), which explain and illustrate classroom strategies for teaching a variety of different kinds of thinking skill lessons. Materials in the Appendices also illustrate a procedure by which you can identify the essential attributes or features of any thinking skill, as well as procedures for designing tests and other instruments to assess student proficiency in any thinking skills you might choose to teach. You will find this information useful in completing Part I of this handbook.

This handbook has multiple uses.* I designed it to help you learn particu-

*A companion to this handbook is also available for elementary school teachers. *Teaching Thinking Skills: A Handbook for Elementary Teachers* is identical to this handbook in structure. Part I is the same as Part I in this handbook. However, the skill-teaching materials in Part II and the teacher essays in Part III of the *Elementary* handbook present materials developed for use only in grades K–6 and the experiences of the elementary school teachers who designed and used them. Thus, it is possible to use this handbook in separate elementary and secondary courses or workshops or to use both handbooks in a common K–12 course or inservice class. Teachers at different grade levels will have immediate access to a considerable number of sample materials directly related to their own teaching responsibilities, while at the same time all engage in a common process to learn the same skills and knowledge related to teaching thinking skills.

lar strategies for teaching thinking skills, strategies that will enable you to teach within an instructional framework that research suggests is the most appropriate way to organize the teaching of thinking skills. These strategies provide direct instruction in thinking skills and can be used to teach any thinking skill using any subject matter to students of any and all ability levels or grade levels. They are presented in detail in my *Practical Strategies for the Teaching of Thinking*, which you may wish to study before or while using this handbook. But to facilitate as much as possible your access to these ideas, I have included excerpts from key chapters in that book here.

The skill-teaching materials in Part II also provide models of the lessons and strategies presented, analyzed, and demonstrated in the Appendices, and which you can learn as you proceed through Part I. Many educators, myself included, believe that mastery of these and similar strategies are absolutely essential to the effective teaching of thinking. Therefore, I have included information about and examples of these strategies as a starting place for you. Thus, this handbook is a *complete* instructional package insofar as this type of skill teaching is concerned. It contains all you will need to master a number of strategies useful in teaching thinking skills to your students right now!

You can also use this handbook to learn any other approaches to or strategies for teaching thinking presented in any other source. The learning procedures presented in Part I will guide you in understanding how to carry out *any* skill-teaching or assessment strategy, if you have additional material that explains, demonstrates, and analyzes that strategy or technique. So, while this handbook contains all the information you will need to learn one specific approach to teaching thinking skills, it also has broader uses. The *procedure* presented in Part I is quite independent of any specific teaching or assessment strategy and may be used to master any strategy for teaching thinking on which you choose to focus.

Indeed, I have tried to make this handbook flexible and to individualize it as much as possible. You may enter it at any point or use only that part that is of immediate interest to you without having to study what precedes it. For example, you may use only that portion of Part I that deals with assessing student thinking and only the sample tests in Part II if all you are interested in at this point is how to produce paper-and-pencil thinking skills tests. Or, if you wish, you may study and use the thinking skills materials in Part II as models for making your own lessons without referring to Part I. You may even pull appropriate materials from Part II and use the lesson plans and tests in your own classes, if they are appropriate to your interests. You may also use the procedures in Part I for learning specific skill identification, skill teaching, and test construction strategies other than those illustrated by the sample materials in Part II and the Appendices. Even within the procedure in Part I, you may skip or bypass certain steps depending on the extent of your experience and knowledge regarding the subject at hand. You may also use the procedures for infusing instruction in thinking skills into any subject or grade level as presented in Part III, quite independently of the rest of the handbook.

You may, in addition, use this handbook as a tutor to help you learn on your own and at your own pace how to carry out the key skills required for teaching skillful thinking to your students or you may use it in working with a group of your colleagues to learn these skills. It can be used as an individual study guide or as an instructional aid in a more formal course on the teaching of thinking or in a continuing inservice effort to accomplish the same goal. This text may serve *in loco instructor* but it can just as easily be used by or with an instructor to guide and supplement his or her own instruction in any approach to teaching thinking.

Regardless of how you choose to use this handbook, you should be aware of the assumptions upon which it is based:

1. Integrating the teaching of thinking skills with subject-matter teaching leads to improved student thinking *and* more meaningful content learning.
2. Most teachers want their students to be more skillful at thinking than the students seem to be if left on their own.
3. Most teachers or teachers-to-be have received precious little preservice training or instruction in how to teach thinking skills to any degree of proficiency using instructional and assessment strategies based on the latest research and theory.
4. Most teachers and teachers-to-be welcome an opportunity to improve their abilities to teach thinking skills, especially an opportunity that supports their own efforts to achieve this goal with skills of their choosing in subjects of their choosing.

*Teaching Thinking Skills* has been designed to provide this opportunity.

## ACKNOWLEDGMENTS

This handbook represents the efforts and talents of many individuals. I wish here to acknowledge their contributions.

Many of the ideas and techniques presented in these pages were born or tested and elaborated on in courses and workshops I have conducted in school systems, at professional conferences, and in universities throughout the United States and Canada. I am indebted to all those who have participated in these efforts. I wish especially to thank the several hundred teacher candidates and experienced teachers who have enrolled in my courses at George Mason University and the teachers who participated in the summer seminars I have offered at Seattle Pacific University over the past few years or so. The insights they have contributed as to how to help teachers learn how to teach thinking skills as well as to how to teach thinking skills themselves have been invaluable.

I am also most appreciative of similar contributions from teachers with whom I have worked on a continuing basis in school systems throughout the United States, including the D. C. Everest Area Schools in Schofield, Wisconsin; the Monroe County Public Schools in Key West, Florida; Lynnhaven Junior High School in Virginia Beach, Virginia; the Walled Lake (Michigan) Consolidated Schools; the Amphitheater Public Schools in Tucson, Arizona; and the Weld County Schools in Greeley, Colorado. The learning experiences we shared have shaped these pages considerably.

Those teachers and teachers-to-be who have contributed the lesson plans and reflective essays featured in Parts II and III of this handbook deserve a special acknowledgment. They are identified in the section labeled "contributors" and their names appear on the materials they authored. Their enthusiasm and talents for teaching thinking are remarkable and, for the readers of these pages, I hope contagious. Without their willingness to risk trying new approaches to teaching and to share with others the products of their learning and classroom experimenting, this handbook would not have been possible.

I am especially indebted to seven colleagues in classrooms, administrative offices, state education departments, and research labs for their invaluable as-

sistance in shaping this text and its contents. I was honored by their willingness to review this manuscript and pleased by the thoroughness of their evaluations. Their astute perceptions, positive and creative suggestions, and enthusiastic encouragement have contributed much to these final pages. To Marion Bennett, Ann Hutchinson, Toby Kline, Jay McTighe, Barbara Pressiesen, Al Wheeler, and Susan Whitten, I offer my sincerest thanks for all their help and advice. And to Erin McVadon Albright, my thanks, too, for her willingness to assist in the publication of this handbook.

Special gratitude goes to Jay McTighe for his dual contributions to this handbook. Not only did he take time from his busy schedule to review the original manuscript and make numerous, excellent suggestions for improving it but he also wrote the Foreword for this volume. Few educators are more knowledgable about teaching thinking or more accomplished teacher trainers than is Jay, and his insights into these areas have proven invaluable. I deeply appreciate his friendship over the years and his contributions to this handbook.

Two other individuals deserve special acknowledgment. Ernestine Meyer typed this manuscript—and retyped it again and again as it evolved. Her skill at this task was outstanding; her enthusiasm, unflagging; and her endurance, amazing. Her skill at weaving through my terrible handwriting and often confused notations makes her contribution to this handbook special. I appreciate more than words can say all that she did to help this handbook become a reality.

In addition, Mylan Jaixen, Executive Editor of Education at Allyn and Bacon, has been exceedingly helpful in engineering the publication of this handbook. I greatly appreciate his continuing support and helpful encouragement—and his welcome sense of good humor—in bringing this work to fruition.

In retrospect, I find it difficult to imagine any teacher-training publication that has benefited from the contributions of a greater range and more talented number of educators than has this one. Classroom teachers, staff developers, curriculum specialists, administrators and researchers, doers as well as theorists—all have had a hand in reviewing, creating, and producing this handbook. I have tried my best to interpret their ideas accurately, to incorporate their suggestions faithfully, and to accommodate their criticisms. To the extent that I have been successful in so doing, the credit is theirs. Where I have failed, the responsibility is mine.

To each and all who have contributed to this handbook, my most sincere thanks and appreciation. It would not *be* without you!

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