Cooperative Learning

Reading is not only a cognitive and affective activity but also an intersubjective, social process, not only a personal act, but also a communal event.

—Mingshui Cai

EVOCATION

In previous chapters, numerous strategies were modeled along with the detailed ERR lessons. We also spoke of the need to be aware of our own process of constructing reality.

With these strategies and ideas in mind, first think, then take five minutes for a freewrite on how you think student thinking and learning can be served by having students work in cooperative groups. You may also think of some limitations to cooperative work. Be sure to note these as well. When you are finished, share your response with your colleagues in small groups. Keep track of similar observations, both pro and con.

This chapter outlines instructional methods that promote cooperative learning among students. As in the previous chapters, the presentation will follow a similar pattern. A discussion will be offered about establishing a classroom environment that promotes critical thinking and encourages cooperative learning among students. Your earlier thoughts on this latter issue will serve as a starting point for examining the utility of cooperative learning and ways to successfully facilitate cooperative-learning experiences. Our discussion is followed by sample lessons that support cooperative learning. The sample lessons involve practical classroom-ready strategies that can be applied directly in classrooms or that may serve as guides for developing other strategies. As usual, the lessons are presented as they would be experienced by students and then are followed by a detailed discussion.

What is important to attend to while working through this chapter is the kind of classroom environment teachers create when employing cooperative-learning
approaches as well as the kinds of outcomes teachers seek for their students through cooperative-learning applications.

The underlying assumptions of this chapter are that classrooms should be

- intellectually stimulating centers for thinking for students and teachers;
- purposeful places where students engage in meaningful, perhaps inspira-
  tional learning experiences;
- places where expectations for student development are clearly defined and
  openly shared with students; and
- safe settings for innovative thought and multiple voices.

The philosophy underpinning this chapter embodies what Arthur L. Costa
(1992) suggested about thinking and content. The process of thinking must also
become the content of instruction. Student decision making, opinion formation,
problem solving, working collaboratively, learning to learn from many sources, and
creatively integrating ideas and information must always be considered part of the
content of curriculum and never separated from the content. Students learn how to
learn by using thinking and learning processes in the study of specific curriculum
content and use the content as fuel for thinking.

The teaching strategies presented here are consistent with the authors’ philoso-
phy presented previously. They are placed within the frame of critical thinking pre-

tented. Strategies presented fit into one or more phases of the ERR framework.

OUTCOME EXPECTATIONS

At the conclusion of this chapter participants will

- understand what is meant by an environment for thinking and how cooperative-
  learning strategies contribute to such an environment,
- be able to plan and implement a number of cooperative-learning strategies in
  class, and
- be able to identify in what stage or stages of the framework various cooperative-
  learning strategies apply.

OVERVIEW

Presentation of cooperative learning begins with a brief rationale before moving to
actual strategies. Though this section too is interactive, it requires some direct pre-
sentation. Keeping your professional response journal available and making dual
entry diary notations during this discussion of rationale is recommended. Following
this will be a presentation of cooperative-learning strategies, which will be experi-
ential. This is followed by review and discussion, examining the various elements
of the strategies. As is our custom, first, we determine how the strategies were
implemented—what the actual process was. Next, we consider how students might
respond to them, analyzing your own experience as a way of understanding what
your students will experience. Finally, we will review the strategies with respect to
fit within the ERR framework for thinking and learning.
As always, planning for implementation is an essential step in the learning process. The end of the chapter encourages development of actual lesson plans using your own curricular content and incorporating the cooperative-learning strategies presented here. These plans should then be shared in small groups or with the larger learning community.

To begin our examination of cooperative learning, think to yourself privately, and write a few notes about the following question: What are the two or three most important skills we can teach our students to prepare them for their future? Remember your earlier freewrite and pull from that thinking if your responses are related or relevant to this question.

Allow a few minutes for thought and then share your thoughts with a partner. In your groups, share your thoughts briefly, keeping track of them on chart paper so all can see the ideas. As a group, consider connections among the various responses.

After sharing and discussing a number of ideas about what students should gain from their schooling, there may be general but not total agreement. Total agreement would be surprising since this question has been one of the greatest sources of controversy in education since the beginning of schooling.

As you read the following text, look to see if what is presented is similar to your own beliefs with respect to the most important outcomes of schooling related to student development, student learning.

CLASSROOMS AS ENVIRONMENTS FOR THINKING

A past president of the International Reading Association, Donna Ogle (1992), stated, "One of the goals of our educational system is to develop citizens who can contribute intelligently to the resolution of issues confronting our society, citizens who can think critically and help to solve problems in local communities as well as in the national and international arena" (p. 25). We hold that one set of outcomes of schooling ought to be maximizing the intellectual growth of students and their capacity to solve problems, advance understandings, become innovative, make decisions, and communicate effectively. To accomplish these outcomes, schools and classrooms must promote active students thinking and support thoughtful discussion and the sharing of ideas, beliefs, and philosophies. In other words, schools must be intellectually stimulating centers for thinking and learning where information (content) becomes the catalyst for further thought rather than the end point of learning.

One means of creating thinking environments is to introduce cooperative-learning methods into classrooms' instructional practices. Vygotsky (1962) made it clear that intellectual growth is the product of both internal processes and external or social processes. He suggested that higher-level thinking emerged from relationships, that is to say, the dialogue between people. Costa (1992) stated, "Together, individuals generate and discuss ideas, eliciting thinking that surpasses individual effort. Together and privately, they express different perspectives, agree and disagree, point out and resolve discrepancies, and weigh alternatives" (p. 177).

In schools, there is often tension between conceptual learning on the one hand and an emphasis on subject content on the other. We know that the greater the knowledge base, the more sophisticated concept development can become and the better able learners are to integrate knowledge across content areas. We also know
that the more broadly and well developed our context is for information, the more information we are able to retain and use effectively. There is a reciprocal relation between content knowledge and process. In reality, it is not possible to separate content from process and maximize learning. Knowledge without the capacity for practical application is like a computer without application software. It has potential to hold a great deal of information but is without practical utility. When process and content are considered of equal importance, students understand that knowledge constructively applied gives knowledge its value, its purpose, its utility. Knowledge, then, represents a kind of stored energy source available for solving problems rather than simply artifacts of one’s educational experience to be recalled and recited at indeterminate intervals.

WHAT IS COOPERATIVE LEARNING?

Cooperative learning occurs when students work together, in pairs or small groups, to address a common problem, explore a common topic, or build on mutual understandings to create new ideas, new combinations of ideas, or unique innovations.

Before we offer one view of a cooperative-learning classroom, turn to a partner and do some paired brainstorming as to what a cooperative-learning classroom might look and feel like and what teachers’ and students’ roles must be in such a class. Take a few minutes for discussion.

THE COOPERATIVE-LEARNING CLASSROOM

There is evidence that learning outcomes are enhanced in cooperative-learning classrooms. Johnson and Johnson (1989) suggested cooperative-learning environments are responsible for the following:

- Higher achievement and increased retention
- More on-task and less disruptive behavior
- Greater ability to view situations from others’ perspectives
- Greater social support
- More positive self-esteem based on basic self-acceptance
- More positive attitudes toward subject areas, learning, and school
- More frequent higher-level reasoning, deeper understanding, and critical thinking
- Greater achievement motivation and intrinsic motivation to learn
- More positive, accepting, and supportive relationships with peers regardless of ethnicity, sex, ability, social class, or special needs
- Greater psychological health, adjustment, and well-being
- Greater social competencies
- More positive attitudes toward teachers, principals, and other school personnel
How, then, does a classroom look and function to accomplish these outcomes? Richardson (1996/1997) suggested that effective cooperative classrooms have certain general characteristics that include

- positive interdependence,
- individual accountability,
- heterogeneous membership and grouping,
- shared leadership,
- direct social-skills teaching,
- teacher observation and intervention, and
- effective group work.

**Positive Interdependence**

Positive interdependence is achieved when students perceive that they need each other in order to complete a group task. Teachers may structure positive interdependence by establishing mutual goals (learn and make sure all group members learn), joint rewards (bonus points for group achievement), shared resources (one paper for each group or for part of the required information each member receives), assigned roles (summarizer, encourager of participants, elaborator), and peer evaluation processes to ensure full engagement by all group members.

**Shared Leadership**

Students promote each other’s learning by helping, sharing, and encouraging efforts to learn. Shared leadership implies that students explain, discuss, and teach what they know to classmates for greater group development.

**Individual Accountability**

To ensure that each group member contributes to group tasks, teachers certainly need to assess both individual and group performance. This can be accomplished in many ways. One way is to be sure each student’s performance is assessed frequently relative to his or her group work, with results given to the group and the individual. Teachers may structure individual accountability by giving individual tests to students or randomly selecting one group member to provide responses to an assessment item. This must be done with care and in a positive context—focusing on demonstrating progress, not catching someone contributing less than his or her share. To substantiate the value of individual and group contribution to the intellectual climate of the classroom, procedures should be in place that allow students to actively participate in the assessment process. Group members ought to evaluate one another along a clear set of criteria. The criteria should define behaviors that facilitate group progress and are readily observable. Individual students likewise benefit from reflection on their own learning and their contribution to their group. Self-assessment is an important part of a comprehensive assessment process.

**Interpersonal and Small-Group Skills**

Groups cannot function effectively if students do not have and use the necessary social skills for collaborative work. Teachers need to teach these skills as purposefully
as they teach academic skills. Collaborative skills include shared leadership, decision making, trust building, patience, respect, responsibility (individual and collective), communication, and conflict management.

**Effective Group Work and Group Processing**

Groups need specific time to discuss how well they are achieving their goals and maintaining effective working relationships among members. Teachers structure group processing by assigning tasks such as (a) list at least three member actions that helped the group be successful, and (b) list one action that could be added to make the group more successful. Teachers also monitor the groups and give feedback to them and the whole class on how well the groups are working.

Children will only become better thinkers if they have numerous opportunities to practice the approaches to thinking to which they are introduced. We should focus on a few thinking strategies that are most useful and transferable from one area to another so that students will be likely to use the skills and strategies regularly. (Ogle, 1992, p. 26)

Like every other skill we develop, the skill of thinking critically improves with practice. Allotting time to this task is the only way it will grow so that students will engage in it in more deliberate and complex ways.

**SAMPLE COOPERATIVE-LEARNING LESSONS**

**Jigsaw**

The first cooperative-learning method we will experience is the Jigsaw method (Slavin, 1986). It is a large-group activity, so the best way to experience this is with a learning community of 20 or more people. This is because the larger group will be subdivided into smaller groups.

Procedure: First, divide the large group into groups of four. The initial grouping is called the home group. Once the home groups are formed, have members count off to four so each member is assigned a number one through four.

Once each member of the home group has a number, inform all that they will be reading an article. Direct their attention to the article titled “Halloween Thoughts: Bats Are Beautiful and Do Good Deeds” by Ken Wells (Appendix C). Explain to the group that the expectation is that everyone will understand the entire article. However, it will be taught by classmates in sections. Each person will read only his or her particular assigned part of the article, but ultimately, the article will be fully understood by everyone.

The article is divided into four parts, and each numbered group (to form momentarily) will be responsible for one part. Now have all the ones gather together; all the twos, all the threes, and fours gather in groups according to their number. These groups are referred to as expert groups. Subgroups should have no more than four individuals. If there are, subdivide the groups again to form two or more sets of each expert group. (In large classes, it may be useful to divide the class in half first, having one half work on a Jigsaw article and the other half work on another topic or article.)
These groups of ones, twos, threes, and fours are referred to as expert groups, and it is their task to learn thoroughly the material presented in their section of the article so they can teach others. Next, members of each expert group are to read their section of the article and discuss it to be sure they fully understand their section. The group then must decide how best to teach the material to others. It is important that each member of the expert group understand that he or she is responsible for teaching that portion of the text to the original home group. It is up to each expert group, as a whole, to determine the teaching strategies and materials that will be used for their teaching. Be sure it is also understood that several participants from each expert group will be asked to teach their section to the whole group for demonstration purposes. Ask participants to form their expert groups and begin working. This process takes time as students work through their article section, discuss the content, and develop teaching strategies.

When the expert groups have completed their work, they may return to their home groups to teach the others their specific content. Each member of the home group is now an expert in a different section of the article. It is important that individuals within each home group master the content of all sections of the article. Home group members should note any questions they may have about the material in any sections of the article. These questions should then be directed to the expert in their home group who is responsible for that section of the text. If they are still uncertain or confused, they should ask the particular expert group for that section to clarify. If uncertainty persists, their question should become stimulus for further research. The teacher's role is to monitor the expert's teaching to be sure information is being transferred accurately and serve as a resource for questions that arise.

Before you begin Jigsaw, start thinking about bats. Ask the group to discuss how they feel about bats, if they have had any encounters with bats, and if bats frighten them. As students read, ask them to record INSERT style new, surprising, confirming, or confusing information.

Now, in your group, turn to the bats article found in Appendix C. It is already subdivided for use with the Jigsaw strategy. Following the steps outlined previously, work in your home and expert groups to become masters of the bats article. When the experts have completed their teaching, ask if anyone has formed a different opinion about bats, and ask all to look over their modified INSERT chart.

Analysis of Jigsaw Lesson

After you have experienced Jigsaw, first think about then share the following:

- How the process worked for you in general
- How you felt as an expert and a teacher
- How you felt in the home group learning from your peers

Think as well about the responsibility of carrying the information back to the home learning group from the expert group and how this influenced your approach to the task as a learner.

Ask yourself the following:

- What was your reaction in the cooperative group when you were being taught by your group colleague?
- How does this strategy change the role of the classroom teacher?
Now, take some time to share these reflections. With your reactions fresh in your mind, consider how Jigsaw and its various elements fit into the ERR framework. In general, Jigsaw is a realization of meaning phase activity. When the groups begin to monitor their own learning, ask questions, and check their own understandings, they are engaging in reflection-phase activities. However, the teaching strategies the experts develop should contain elements of all three stages of the framework.

The Jigsaw method precipitates student involvement across all three phases of the framework. Its applications reflect the cyclical, “mini-framework” model experienced during “The Sniper” lesson.

**Paired Reading and Paired Summaries Demonstration Lesson**

Paired reading is a wonderful strategy. We have been in countless classrooms where young third and fourth graders are huddled together in pairs throughout the classroom working together diligently to understand what they are reading. Older students “sit” together in various configurations debating their understandings in order to arrive at some consensus. Here, this paired reading process is coupled with a paired summary process.

This strategy was developed by Don Dansereau (1994) and his colleagues at Texas Christian University. It is a cooperative reading strategy particularly useful when text is dense and is a helpful strategy in content courses where reading material might be complicated or laden with facts.

The steps are outlined below. This strategy is actually more complicated to explain than to do. So follow closely but engage in the strategy so you will see how much more evident are the steps when applying the strategy.

To begin, the article “The Heart Beat” by Robert I. Macey (Appendix D) will be used to demonstrate this strategy. This is a whole-class activity; before turning to the article, ask people to join in pairs. Your partner at the beginning will be your partner for this entire process. In a moment, you are going to read the article in a particular way, as with Jigsaw. You will be responsible for knowing what is in the entire article, but for now you will be focusing on just one section. Once in pairs, each pair counts off by fours. Each pair is then assigned a one, two, three, or four since the article is divided into sections one through four. Each pair will now be responsible for the section of the article corresponding to its number.

This next piece to this strategy is most important. Each member of the pair is going to play two distinct roles. Each will take one or the other of the two roles, then switch roles as they read.

1. The first role is that of reporter. The reporter’s job is to read the section carefully and summarize the content. After reading the section, the reporter will tell, without looking back at the section, his partner in his own words what the reading was about.

2. The second role is the responder, which is equally important. The responder also reads the section and then listens carefully to the reporter. When the reporter has finished reporting, the responder asks the reporter any questions that might clarify the reading or reveal more information. The responder might ask, “What about . . . ?” or “Do you recall . . . ?” or “Was there something about . . . ?”
Each person in the pairing will play both roles, so each article section is again divided into two segments. Recall the first division is into the four sections corresponding to the numbering of the pairs, and each section is assigned to a pair according to their number. Now, within each of the numbered sections, reading is divided approximately in half.

After the pairs are assigned their section and have decided which role they will play first, they are ready to read. Each pair will be responsible for reporting back to the whole group, so they should thoroughly understand their section. The pairs should find a comfortable spot in the room to work (at desks, tables, on the floor away from others, or in corner of the classroom). Conversations must be at moderate volume, or the room will become too noisy. The process will take some time until students become comfortable with the roles. Enough time must be allowed for all pairs to complete the task.

The final step involves pair presentations to the whole group. The whole class should be made aware of this final step from the beginning so they will read with this task in mind. Reporting to the whole group can take many forms. One method that works particularly well with paired reading and paired summaries is post-graphic organizers. Graphic organizers offer an excellent way for students to summarize their understandings from the text. In the “Heart” article, a post-graphic organizer is particularly suited to the content. (See Figure 6.1.) To complete this part of this strategy, each pair, using colored markers and a blank

**Figure 6.1** Post-Graphic Organizer

Cardiac Output (C.O.)

- **At rest:**
  - 4 tanks full of blood
  - 1 liter/hr
  - 60 liters/min

- **Exercising:**
  - 25 liters/hr
  - 40 liters/min

- **Athlete:**
  - Increased CO by increasing heart rate
transparency sheet or laptop and graphics programs if available and the users are skilled, summarizes, using creative visuals, their understandings of their numbered section of text. After each pair has created a summary and graphic organizer, each pair should present its summary and graphic organizer to the class, beginning with the first section of the article and proceeding in sequence. Both members of the pair need to come forward, even if only one speaks.

Working with difficult text, it is possible for students to get confused or for different pairs assigned the same sections to have different understandings. The teacher’s role is to monitor the work in progress by moving from pair to pair during development of the summaries to learn if there is confusion and to guide students to clearer understandings. It is useful in some instances, however, to let various understandings surface where discussion can be encouraged to determine how best to consider the information.

With these directions in mind, you can proceed to reading the “Heart” article accordingly. Before you begin reading, an evocation is required. For this reading, we often put a small dot on the board at the front of the classroom. It is so small it can hardly be seen or for some is not visible at all. We point out that this dot is there and that we are going to read about how a dot much smaller than this one can kill. At the end of the lesson, everyone should know why that is so and so much more.

**Analysis of Paired Reading and Paired Summaries**

To begin our analysis, in your pairs, start by describing how the process worked for you. There are many parts to this strategy, so be sure the discussion hits most of the components. Consider how you felt and behaved in the role of (1) the reporter and (2) responder. These are quite different roles, and your reactions are likely to be quite different for each. Did you feel any added responsibility knowing you would eventually teach others? Do you believe this feeling of responsibility intensified your attention to content? Do you think it will do the same for your students?

This strategy offers several instructional advantages. The first advantage is the notion that two heads are better than one when students are confronted by difficult text. Pairing students enables them to put their minds together to decipher difficult text, resolve confusions, and apply two sets of vocabulary to the task.

The second advantage is that when readers engage in the two roles, they accomplish two things. First, it sharpens readers’ focus on the content and serves to maintain student engagement while reading difficult text. Second, it allows immediate opportunity for review and reflection, while giving students opportunity to put their understandings in their own words. Third, by creating joint summaries, pairs must engage in dialogue about content as they develop a concise language to convey what their section is about. Fourth, this strategy demands that students listen carefully to each other and share responsibility for teaching and learning. And fifth, having several pairs assigned to each section, the whole-group sharing presents the content in different ways, offering a variety of opportunities for understanding as well as opportunities for repeated exposure to the content. Furthermore, through whole-group sharing, the teacher can monitor understandings and correct misunderstandings.
Paired reading is a complicated strategy to describe and somewhat complicated to implement the first time. However, it becomes rather natural after several implementations, as students grow accustomed to their roles and the general procedures. At this time, take a few moments to consider where this strategy fits in the ERR framework. This may be complicated because parts of the strategy fit into different stages of the framework. The paired reading and paired summaries strategy fits into the Realization of Meaning phase, though it engages students in a considerable amount of reflection. It is primarily intended to facilitate the construction of meaning during an encounter with text. Post-graphic organizers are clearly reflection phase activities. After the presentations are complete, it is helpful to have a conversation with the whole group to check for thorough understanding. We often also view a web-based video that further summarizes the article content. One such website is http://www.youtube.com/watch?v=fLonh7ZesKs.

Corners

Corners is a cooperative-learning activity that is intended to generate debate and use group processes to stimulate constructive arguments. In fact, it is a great strategy for generating thoughtful, even impassioned debate. Every four years, we hear much about the presidential campaign and the first-in-the-nation Iowa caucuses. At its heart, this now legendary political tradition in the heartland of America is a modified Corners procedure. Caucuses come alive as supporters of the various candidates gather together and develop arguments intended to either persuade fellow caucus goers to come to their side or dissuade them from selecting other candidates. From the ensuing discourse, opinions are formed, cast adrift, and formed anew before the final tally is taken. Corners can be just as much fun, as it is used in classrooms as an active and enjoyable means of managing debates on controversial issues where two or more positions might be represented. It can be used following a class reading of a text, following a lecture or film presentation, or simply following a topic prompt for students to consider.

The directions for Corners are fairly straightforward and are intended to get students to take a stand on an issue and defend it. The strategy also encourages listening carefully to others and emphasizes the option to change opinions if the thoughts of others are sufficiently persuasive. In fact, this particular activity encourages students to change their minds as they listen to the thoughts and arguments of others.

Corners Demonstration

For our purposes here, this lesson will be on a topic offered by a prompt that follows.

In the state of Maine, there remain many unsettled lakes. For years, paper companies owned, for logging purposes, the land around these lakes. This deterred development. Now, paper companies are selling the land in large parcels of 1,000 acres or more, sometimes 30,000 to 40,000 acres at a time. These size lots are expensive, so only developers are able to afford them. Concern is now being expressed that these pristine wilderness lakes will become overdeveloped, destroying water quality, fish populations, bird-nesting areas, and other wildlife habitat. To combat this,
potential ecological consequence rules are being put in place requiring developers to set aside approximately 50% of any development land and 50% of any developable shoreline, and permit lot sizes sufficient only to keep building back from the shore and out of view from the lake.

While protecting the environment, these rules drive the cost of lots up so high that only the wealthy can afford lakeside property. Now that the land is finally available, most Maine residents cannot afford to buy and are losing access to lakeshore as the land is bought by wealthy, out-of-state, absentee landowners.

The question for discussion is, “Should the rules remain in effect to protect the environment, or should they be dropped?” Environmental studies have shown that these rules represent a minimum requirement for protecting water, habitat, and land, so compromising these rules is the same as dismissing them in terms of intent. Yet keeping the rules means only the wealthy few enjoy the pristine wilderness.

After presenting the issue or topic, proceed as follows:

1. Begin thinking independently about the issue until you come to some tentative conclusion about where you stand.

2. In our example, you can be in favor of the regulations, opposed, or undecided. It is important to give students two or more options to consider. The teacher may determine the various positions students can take on an issue in advance, or students may brainstorm various stances. If “undecided” is a category, encourage students to take this position only as a last resort. Explain that they can take a stand tentatively and change their mind later. If undecided is an allowable category, at the beginning of discussion, students should be advised that by the end of discussion they will have to take a stand.

3. Next write for three minutes in support of your position, generating your own argument. Be as compelling and persuasive as possible.

4. When writing is finished, find out who supports regulation and assign them one corner of the room. Those who oppose go to another corner of the room. Those undecided could move to another corner. If there are other predetermined opinion groups (as may be the case for other discussion topics), they should have their own place to go in the room as well.

5. For 5 to 10 minutes or so, each group member should share her writing within her group and review the reasons for her positions. Arguments should be developed defending the group position and/or debunking anticipated arguments from the other group. The group selects one or two spokespersons to initially represent the group in the debate that will follow. Once debate begins, all group members should participate in the ensuing discussion.

6. Call for the debate by inviting each group to state succinctly its position and the major reasons for supporting its view.

7. Once the formal debate has been presented by the group spokespersons, other group members should now be encouraged to participate in the conversation. If the groups need encouragement, ask some probing questions:
   • Why should those of you in Group A not accept the opinion of Group B?
   • Where do you disagree with what Group B has to say?
   • What about the undecided group? What prevents you from taking a stand?
• What have you heard that moves you toward a clearer opinion?
• Why are those of you in Group B unconvinced by what Group A has said?

8. Some students may change their minds as a result of the discussion. They should feel free to change groups at any time. They simply have to walk from the group they are in to the group with whom they now agree. In fact, encourage students to move as their opinion shifts. Also, encourage members in the groups to try to persuade others not to leave their group. This puts the burden on the members within each group to be persuasive in order to keep group members as they try to draw more adherents. Students can take notes on their thinking as they listen and discuss, which will help later when they have to write about their position on the issue and defend it.

9. Once the discussion has ended and everyone has moved to his or her final group, ask each group to summarize its position and the reasons that support it. Then, ask all students to write a position paper, setting out their individual positions and the reasons behind them. (A more elaborate paper will take opposing arguments into account but defend the chosen position in the face of them.)

Analysis of Corners

Begin analysis by reflecting on the process. There are several steps to this strategy; some require individual work while some entail group work. First, consider your impressions as a learner working through the various steps along the way. Go through them one at a time with ERR as your guide.

Step 1 presented the topic and some background information for consideration. This provided a brief evocation. For this strategy to be successful, students will have to know something about a topic or issue so they can develop an informed opinion from the beginning. However, even when moving to Step 2, it is not necessary to be an expert on the issue. It is rare that we become experts on issues before we formulate an opinion. In reality, our opinions are often based on factors not directly related to an issue, and we discover those factors only when we are asked to defend our opinions.

Step 3 asked you to work individually to formulate your own thoughts. This requires taking a stand before hearing from others. While it may be difficult for some to do this, it is an important part of the process. We know that learners are more likely to become engaged in the learning process and learn best when they have a stake in what is being discussed. By taking a position from the beginning, students are staking their claim in the conversation. This step involves two stages of the framework, depending on whether you are looking at the strategy globally or at this particular step in the process. From a global perspective, the Corners strategy is either a Realization of Meaning or a Reflection activity or both. Everyone is already informed, though briefly in our example on the topic. They have activated awareness of previous knowledge and beliefs. Group deliberations and the discussion and/or debate that ensues constitute a genuine encounter with new information, consistent with the Realization of Meaning phase. Only here, the content is the thoughts, arguments, and viewpoints of other students, and the information source is the collective wisdom of the class. Because of the importance of valuing students’ knowledge and the considerable contribution students can make to the knowledge base of their peers, we consider Corners a Realization of Meaning phase activity.
Step 4 is a powerful component of this strategy because it requires participants to commit actively to a position. A public statement of one’s thinking commits an individual more definitively to a viewpoint while emphasizing the point that everyone has opinions and that those opinions count.

Steps 5, 6, and 7, as mentioned, are all considered to be a Realization of Meaning activity as students listen to the voices of their peers and consider the meanings being constructed about the issue. During these steps, it is important to monitor the conversation to be sure that many voices in the classroom are heard.

Step 8 is central to the strategy and provides participants with permission and opportunity to change their minds publicly. Understanding critical thought means understanding that thinking is a continuous process that can lead to different conclusions. Changing opinions is one legitimate outcome of thought. Changing one’s opinion is a natural and predictable consequence of careful thought. This step also requires students to articulate their thoughts in ways that communicate them clearly to others. It is important to have opinions, but their value is enhanced when shared with others.

Summarizing the group’s position and rationale and then writing individual position papers, as suggested in Step 9, are Reflection Stage activities. Asking for both group and individual activity reinforces the notion that students are ultimately responsible for their opinions and beliefs, and they must offer their own justification for their views. Certainly, their views will have, as their source, the thoughts and wisdom of others, but in the end, they must be able to express their views in their own words.

**BRIEF COOPERATIVE STRATEGIES**

There are many strategies that promote cooperative learning yet take little time to implement. These simple strategies offer excellent means of introducing students to working in pairs or small groups. This section will describe a number of such strategies. You are encouraged to experience them as presented and then review them in pairs in your larger group and discuss them in terms of your own experience. Be sure to discuss where and how they fit into the framework and how to modify them to fit your content area.

**Paired Predictions**

The first of these is called Paired Predictions, which can be used in many content areas. The following example is used in children’s literature classes, where students will read a children’s novel titled *Tonight by Sea* by Francis Temple. Ask if anyone has read the story previously. If yes, tell them to listen again, now. Ask students to group in pairs with paper and pencil. Explain that they should listen carefully as you read the following list of words, which refer to the characters, the setting, and some to the story itself.

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Have students form pairs and discuss with their partner a mutual idea of what this story might be about, making some prediction about the story. Allow five or six minutes for discussion for them to write their predictions so they can refer to later as they read the story. Of course, in our example, they will not be reading the story as the story is being read to them. This prediction activity can be done only at the beginning of the story. Then, as the story unfolds, the pairs come together at various points throughout the story to modify their predictions. It is likely quite clear by now that this is an excellent Evocation activity to implement before reading a text or chapter and continues to serve as evocation for subsequent readings.

**Think, Pair, Share**

Kagan (1992) described this strategy. It begins with the teacher telling the group they are now going to be assigned a topic for their individual consideration. The topic or issue should be something interesting and related to course content. Perhaps, for your purposes here, topics like teachers’ salaries, the value of space exploration in a time of economic difficulty, or global warming might be relevant. Think individually about a topic for a few minutes; then pair with a partner and share your thinking. This should take only a few minutes. Think, Pair, Share is a quick, simple, cooperative-learning technique that can be incorporated into most content areas, typically as an Evocation activity. It works well with large groups and is excellent to use prior to a talk. Of course, this strategy has been employed frequently in this text and so is familiar already.

**Summarize, Pair, Share**

Recall the “Heart” article we read earlier. Just take a few minutes and write a summary of the article in two or three sentences. When finished, turn to your partner and share your summary statements. Discuss any similarities or differences to see if you can come up with a mutually agreeable summary. Allow only three minutes for each part of this activity. This simple paired activity is an extension of Think, Pair, Share typically used following a presentation, reading, or discussion of a topic as a Reflection phase activity.

**Formulate, Share, Listen, Create**

Johnson, Johnson, and Bartlett (1990) offered this strategy. It is a similar activity in which teammates first privately formulate responses, then share and listen in turn, and together create a new answer or perspective through discussion and elaboration. This activity has widespread application and encourages students to stretch their thinking.

We spoke earlier about the benefits of cooperative learning. There are some added benefits to using these brief strategies. By promoting focused, short-term, purposeful talk among students, informal cooperative-learning techniques such as Think, Pair, Share can ease students into cooperative peer relationships. As students learn to work cooperatively on more complex team tasks, these informal structures can be used to facilitate group interaction.

These short cooperative-learning techniques and strategies can be incorporated into instruction easily and quickly, applied to all content areas, and offer students an opportunity to work cooperatively during all stages of the framework.
COOPERATIVE MATH ACTIVITIES

Making the Target Number

Mathematicians Glenn Nelson and Earl Ockenga (1997) have developed a number of cooperative activities for use in mathematics instruction, including “Making the Target Number.” This is one of our favorite math activities, and you are encouraged to follow the instructions and work through this strategy. It can be done alone but is more fun in groups.

1. Divide the large group into groups of four or five and give each group a set of digit or number cards, one through six, and a set of target cards (10, 20, 30, 40, 50, 60). Alternatively, one set of number cards and a single target card may be drawn for the entire group to work on. This is best when demonstrating the strategy to a class.

2. Place the number cards in a hat or a small container and ask a member in each small group to select (without looking) five number cards and one target card. It is important when drawing the number cards to return the selected number card to the hat after it has been drawn and recorded. It should be mixed in with the other number cards to possibly be drawn again. It is fine to draw the same number more than once.

Example:

Number cards       Target Card
3 – 5 – 5 – 6 – 4   50

3. The task now is to use each drawn number indicated on the selected number cards only once (but each drawn number must be used) in any combination of mathematical operations to reach the target number. Once the number cards are drawn along with the target card, students can begin to find solution formulas.

For example, looking at the cards selected from above—3, 5, 5, 6, 4—some solutions include the following:

\[(3 \times 5 \times 4) / 6 \times 5 = 50 \quad \text{or} \quad (5 \times 5) \times 4 / (6 / 3) = 50\]

Some students will catch on more quickly than others or find solutions to particular sets of numbers more quickly. Once they have discovered one solution, they should look for additional solutions. Most, though, not all, number combinations have multiple solutions. One additional rule to help: It is fine to use exponents, but each exponent must be from a number card and counts as a number used from the five available numbers.

What’s the Number?

This is a math detective task that can be performed in pairs or small groups. It also can be modified to apply to other content areas such as geography: “Where am I?” or history: “Who am I?”
First, look at the “What’s the Number?” number chart and the example clues below. Form pairs and ask one member for each pair to pick a target number silently. Then he or she should lead the partner through a series of clues until the partner chooses the correct number. Try the following example:

I am thinking of a number.
1st clue: It is an even number.
2nd clue: It is divisible by eight.
3rd clue: It is between 20 and 40.
4th clue (if necessary): The sum of the digits is six.
5th clue (if necessary): The tens digit is half the ones digit.
6th clue (if necessary): The number is divisible by six and three.
The example target number is 24.

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Both math examples seek to engage students in math activities that require applying knowledge to finding solutions without resorting to rote tasks that deaden math experiences. In the first instance, students must muster all their knowledge of math operations and apply them creatively to find solutions. The first strategy also demonstrates that even in math, there is more than one right answer. The second strategy asks students to recall their knowledge of the various ways numbers are grouped and described. It requires students to consider the quality of numbers, their identities if you will. Both strategies are considered Reflection phase activities.

**Roundtable-Round Robin**

*Roundtable* (Kagan, 1992) is a strategy in which one paper and pencil are passed around a group. To reach a solution to a word problem, one partner writes an idea in a single sentence or two and passes the paper and pencil to the partner on the left. That partner adds to the idea presented and passes the paper to the next. A variation of the procedure is to have each partner use a different colored writing tool when the paper is passed. This visually encourages all partners to contribute equally and allows the teacher to document individual contributions. *Round Robin* (Kagan, 1992) is the oral form of Roundtable. Each teammate verbally contributes an idea to the group in a systematic, around-the-group fashion. Both variations on this strategy are typical Reflection stage activities, but if students have enough prior knowledge, they can be used as Evocation phase activities as well.
BRIEF EXERCISES FOR PROBLEM SOLVING AND DISCUSSION

This section presents additional cooperative-learning strategies, which are described in greater detail in Baloche (1998), Kagan (1992), and Johnson, Johnson, and Holubec (1993).

Kagan (1992) called his suggestions for teaching cooperative-learning structures. Unlike the Jigsaw presented earlier in this chapter, cooperative-learning structures can be used without extensive prior preparation on the part of the teacher. And while some of these cooperative structures may not teach quite so thoroughly as the alternatives, they are easier to use, and thus, perhaps more likely to be used. Our advice? Don’t scrimp on strategies such as Jigsaw because they are effective. Take time to prepare them, save them for reuse in future years, and share them with other teachers. But take advantage of cooperative-learning structures as well. They are lively and enjoyable, and they help students learn to think.

Stationary Group Activities

*Numbered Heads Together*

1. Students form small groups of three or four.
2. Students count off within their small groups from one to three or one to four.
3. The teacher poses a question or problem.
4. The students consider the problem alone.
5. The students then discuss the problem as a group.
6. The teacher calls a number, and each student with that number reports to the whole class on the group’s discussion.

*Pens in the Middle*

This is a quick strategy for promoting small-group conversation involving all students. As students begin to share ideas in the typical cooperative-learning group (3 to 7 members), each student marks his or her contribution by placing a pen or pencil on the table in the middle of the group. That individual may not contribute again until all pens are in the middle.

With this simple approach, all members are equal in their ability to contribute, and no one may dominate or remain silent. Once under way, students often continue to comment without placing their pens in the middle. This is an ideal outcome. However, if the conversation veers from mutual levels of contribution to some dominating speakers, the teacher can remind students to use their pens.

*Trade a Problem*

1. The teacher gives a lecture or assigns a reading. (Appropriate evocation activities should be used.)
2. Students are assigned to random pairs.
3. The pairs identify four or five main points in the lecture or reading.
4. These pairs join other pairs to form foursomes and discuss the main points and clarify uncertainties.
5. Each pair now writes a set of questions to answer or problems to solve for the other pair.
6. The pairs link up again and quiz each other.
7. The four students reflect on what they have learned from the exercise.

Exercises That Require Movement Around the Class

*Stirring Up the Class*

1. Students count off within their home groups of three or four.
2. The teacher poses a question or problem.
3. The students consider the problem in their home groups.
4. All the students with the number *one* then rotate to the adjacent group and share the results of their home group’s deliberations.
5. Students return to their home groups.
6. The teacher asks another question or poses another problem.
7. The students discuss their ideas within their groups.
8. All the students with the number *two* rotate two groups away and share the results of their home group’s deliberations.
9. This idea continues with numbers three and four doing likewise. Number fours should not move over four groups because that will bring them back to their home group.

*Mix, Freeze, Pair*

1. The students stand and move freely around the classroom.
2. The teacher says, “Freeze,” and the students stop.
3. The teacher says, “Pair,” and each student pairs up with the nearest person, taking whatever seats are available.
4. The teacher asks a question, and the students discuss it.
5. The process is repeated several times.
6. A variation is to have students form an inner and outer circle with an equal number of students. The circles then rotate in opposite directions until someone says, “Freeze.” The persons opposite each other at that point become partners.
Rotating Review
1. A number of questions (6 to 8) are written on numbered sheets of newsprint and posted around the room.
2. Groups of three or four students are assigned a question. They move to the sheet with the question on it, discuss the question for four to five minutes, and write their answers on the sheet.
3. At a signal from the teacher, the groups move to a new sheet, read the question and the answer that have been written, and add their comments on that sheet.
4. The teacher calls for the groups to move on—repeating the process, if possible, until the groups return to their original sheets.

Gallery Tour
1. In groups of three or four, students first work through a problem, preferably with varied possible approaches, and produce a demonstrable product such as a diagram on chart paper.
2. The products are taped to the walls around the room.
3. At the teacher’s signal, the groups rotate around the room to examine and discuss each product. They take notes on their observations and may leave written comments on the display.
4. After the gallery tour, the groups reexamine their products in comparison to the others and review the comments left on their own work by others.

One Stay, Three Stray
1. The students first work through a problem with varied possible approaches and produce a demonstrable product such as a diagram on chart paper.
2. The students within groups count off (1 to 3).
3. Each group is numbered, as well.
4. At the teacher’s signal, students rotate: Student 1 rotates one group, Student 2 rotates two groups, Student 3 rotates three groups—but one student does not move. Note: It is best to do rotations one step at a time.
5. The student who stays in the home group explains the group’s work to the rotating students.
6. The rotating students ask questions and take notes in preparation for reporting back to their home groups. Each visitor makes one specific comment on the work he or she has been shown and thanks the home-group student for the presentation.
7. Students all move back to their home groups.
   a. The home-group student who did not rotate reports to the other students on the rotating students’ comments on the work.
b. Students 1, 2, and 3 now report on what they observed in the other groups, noting similarities and differences with their own work.
c. The students discuss their own work further.

At this point, it might be good to stop and form groups to discuss the strategies just covered. Groups should check for understanding and ask questions if anything is unclear.

CHAPTER REFLECTION

Classrooms where cooperative-learning strategies take place are often full of the sounds of student voices. They may even look somewhat chaotic, though they are not. Implementing cooperative-learning strategies does require setting some ground rules to guide students' engagement. Some suggestions have been offered for how to manage cooperative classrooms, but each setting is different. Consider for a few minutes the rules you might set for student involvement in cooperative-learning activities. Think also how the rules you suggest might advance or inhibit cooperative-learning. After you have your list, share in a small-group setting. Discuss why you think the various rules might be necessary and their potential impact on individual students and the group as a whole.

When finished discussing cooperative-learning rules, organize in small groups according to content area if possible and have a content text available. Now, with a genuine content text in hand, plan how you would implement several of the strategies from this chapter using the selected content. Plan a lesson according to the ERR framework using cooperative-learning strategies. When finished, share your plans with the small groups where possible.

Finally, take out your ERR framework chart and add the strategies from this chapter to the chart. Be sure to talk through where each strategy falls in the teaching and learning framework.
Creating Thoughtful Readers

Because reading is "thinking cued by text," readers create meaning by interacting mentally with the words on the page.

—Rachel Billmeyer

EVOCATION

Have you ever stopped to consider the sheer volume of reading material available to American readers? The numbers are staggering. According to Morrow (2008), in 2002, the total number of periodical titles published in America exceeded 60,000. Barr and Harbison (2009) reported the total number of nonperiodical materials such as books, manuals, and new editions reached 185,969. Then, there are e-mail and instant messaging and text messaging and Twitter, and blogging, and on it goes. In 2008, it is estimated, publishers’ net shipments to dealers was a total 3,106,000,000, and by 2011, projections are for that total to rise to 3,132,000,000 with estimated domestic consumer spending on these publications of $63,525,000,000. How do we sort it all out? How do we decide what to read, what’s important, what information is dependable?

Brainstorm for three to four minutes on your own reading experiences, and jot down your ideas. Think of the number of different sources of written material you encounter in a month. Then, think of all this reading you do and how you process what you read. Does it vary with the type of text, purpose of text? How so? What, if anything, do you do cognitively to prepare for reading? Does your preparation vary according to text type or reading purpose? Share your thinking in small groups, and note similarities and differences in approaches to these varied reading tasks. Keep these ideas in mind as you work through this chapter.
This chapter has several purposes. The first is to introduce a way of conceptualizing literacy in general and reading in particular that allows us to think of literacy and reading as tools for critical thought rather than simply subjects to be studied. The second purpose is to present readers’ workshop and other approaches to reading that fully engage readers in the reading process. Readers’ workshop is primarily a method of approaching reading that involves extended silent reading as well as sharing and responding in a systematic and well-orchestrated way. Readers’ workshop will be presented here as both a format for understanding a critical reading process and an instructional model. A third purpose is to describe and model how a critical reading process can be applied to content-area instruction to enhance student engagement and subsequent reading comprehension.

First, a brief discussion is offered clarifying the role of reading as a tool for thinking and learning. Following this discussion, readers’ workshop is modeled and discussed. Then, example applications of the readers’ workshop model to content-area studies are presented. It is important to understand that the instructional model, readers’ workshop, is designed primarily for reading and literature teachers. However, understanding the reading processes underlying readers’ workshop contributes to the effective application of the reading process to content-area studies. We believe it is useful for all teachers to experience readers’ workshop, as the subsequent conversation describes how reading can become an effective tool for content learning.

Readers’ workshop is a comprehensive approach to reading instruction implemented in classrooms independent of the ERR framework. However, it readily fits within the three-phase framework, and learning is enhanced when application of the reading process to content areas is considered within the various phases of the framework. Here, our discussion places applications of the reading process within the framework and includes some underlying assumptions. These include the following:

- Reading is a primary medium through which people are exposed to new information throughout their lives.
- Developing fluency is a necessary but not a sufficient skill for thoughtful consideration of text. Thoughtful, critical readers develop out of an instructional model that guides learners beyond fluency and through diverse genres of text.
- Reading is a tool for thinking and learning and not simply a subject of study.
- Reading and responding to reading are avenues for critical analysis.
- Content-area study typically requires considerable independent reading; therefore, understanding the reading process can enhance comprehension and subsequent reflection in content-area study.
- There is a powerful link between reading and writing. Both are essential tools for learning and thinking. Understanding the reading-writing connection enhances learning, enables teachers and students to more effectively utilize these tools, and increases content learning.

OUTCOME EXPECTATIONS

At the conclusion of this chapter readers will

- understand the role of reading as a tool for thinking and learning;
- be able to implement readers’ workshop in a classroom;
• apply the reading process to content area studies;
• understand the role of reading, the role of engagement in the reading process, and the difference between reading comprehension and reading for thinking; and
• be able to apply both the ERR framework and readers’ workshop simultaneously.

DISCUSSION OF A THOUGHTFUL READING PROCESS

Begin by forming pairs to consider the following statement and set of questions.

It has been suggested that learning is about thinking and doing, that is, about thoughtfully and actively creating new meanings, new realities. If this is true, then classrooms must be thoughtful, active, yet reflective places. What must teachers understand and do to make classrooms thoughtful, active, and reflective places while students are engaged in the reading of text? These questions deserve our attention. With your partner, brainstorm responses to these questions. Take about seven minutes to reflect on the questions and enter them in your journal. After seven minutes or so of paired discussion, share your responses, listing them on chart paper. Then in large groups, review and discuss the various points to ensure clarity of the ideas presented.

You are now about to read a brief presentation about reading thoughtfully. You will actually engage in two learning strategies simultaneously. The first will be assigned below and is a paired reading and paired summaries strategy. The second is described within the presentation. Continue to work in pairs using the paired reading and paired summaries strategy presented in Chapter 6. You will see that the following presentation has been divided into two sections (A & B). With your partner, decide who the reporter and the responder will be for each section. With this decision, read the presentation with the understanding that there will be whole-group sharing of what the presentation means and how it relates to earlier thinking about thoughtful classrooms. When reading is complete, take a few moments to write down some impressions from the reading, drawing connections to earlier paired and large-group discussions about thoughtful classrooms. Alternatively, take a few moments to write your reactions to the reading, being mindful of your earlier thoughts.

Part A

Reading Thoughtfully—A Brief Presentation

Now, before we begin, take a moment to think about your own reading history. Think back to your earliest school memories and even earlier. Try to recall your earliest encounters with print. Try to think of your literacy experiences in and out of school. What influenced you to develop as a reader? You may want to write out a few notes or just bring these memories to an awareness level for now. Later, there will be time to share your early literacy history with others.

Before we begin examining approaches to improving reading comprehension, we want to build the case for why it is essential that we take this task
seriously. We also wish to share some preliminary thoughts about what we consider some requisite elements of reading instruction essential for improving reading comprehension.

Before reading, however, create a Dual Entry Diary in your professional development journal. On a blank page, draw a vertical line down the middle of the page. As you read, enter in the left column ideas that strike you as important or otherwise noteworthy. On the right, jot a few notes reflecting your thinking. When finished reading each section, first have the reader summarize the section. Next, the respondent should react to the reader’s summary. Following this step, each should turn to her or his Dual Entry Diary and discuss her or his entries.

As we consider how we become thoughtful readers, it might be useful to get a context for reading in terms of the volume of reading we do and its value. We already saw earlier in this chapter the overall volume of reading in terms of publications and their commercial value, but what of individuals? Contrary to some opinions about the impact of television and other technology on learning, the medium we most depend on for sharing information and through which we learn is reading. Whether reading from textbooks, journals, manuals, web-based sources, or other written text, people wishing to be better informed, better skilled, or simply more aware of issues that affect their lives must read. Yet for some students, reading does not always provide access to new knowledge, new understandings, or new ways of doing something. In fact, Beck and Dole (1992) reported on a number of studies that demonstrated that even for good students, reading new information in science and social studies texts did not result in altered misconceptions, misunderstandings, or erroneous beliefs. This distressing failure to comprehend occurred despite direct presentation of information in the text that conflicted with students’ previously held notions and beliefs. In other words, readers’ schema for content is often undisturbed by their reading despite glaring contradictions.

One reason a student may not derive much from informational text may be explained by the research of Nell Duke (2003). Duke reported beginning readers spent almost no time (3.6 minutes per day) with informational text, while most reading time was occupied by reading narrative text. Students experience little preparation for responding to the type of academic text they will encounter throughout their schooling and their adult lives.

Furthermore, we may be encouraging students to stay disconnected from the reading process by focusing on low-level “comprehension” of written materials. Again, Beck and Dole (1992) suggested that “reading comprehension” is often considered in a classroom context to be simply a matter of understanding the details of what an author has written. Consequently, if students are able to recite what the author has said, they are applauded for understanding the text, when in fact, this may not be true at all. If by understanding we mean students have incorporated some form of negotiated meaning from text into their own knowledge base (schema), and dealt with any contradictions, and are able to apply these new understandings at critical points in their own lives when necessary or when so inspired, then mere recall cannot be considered understanding. If all we ask of students is to recall and recite, then we will not know if any higher-level comprehension has occurred, and we will not know if students truly understand text.
James Voss (1992), describing the Beck and Dole work in regard to the distinction between reading for low-level comprehension versus reading for thinking, wrote the following:

The importance of this orientation distinction should not be underestimated. Literacy is a function of the person and the context. A political scientist reading an editorial, typically, will evaluate the article's contents virtually as the reading takes place. A novice will focus on what the writer is saying. Because there has been so much preoccupation in teaching with the idea of comprehending what is written, we have neglected the study of how what is written can be interpreted by different individuals. What is written is... is... an opportunity for a person to provide an interpretation of meaning to what is read. (p. 1)

For reading to be useful beyond the next No Child Left Behind assessment and to become an integrated interpretive process requires actively engaged readers connecting what they are reading to what they already know. Good readers are thinking about the author's message in personal terms, filtering text through the prism of their own experiences. Our primary task is to help readers develop the capacity to become and remain engaged, thoughtful, and reflective readers, connected to and responding to text by moving beyond naive recall to complex consideration of content.

As a mechanism for conveying a global understanding of how students become thoughtful readers, we will briefly experience readers' workshop. Readers' workshop, elaborated eloquently by Nancy Atwell (1998) in her book In the Middle, is a method, a grand strategy if you will, by which readers develop the skills necessary for interacting continuously and meaningfully with text. It sets in motion an instructional sequence, grounded in best-practice research about reading and thinking, which moves students beyond low-level reading skills to a point where reading becomes a sophisticated tool that incubates complex thought. Readers' workshop, as described here, is implemented fully in reading class, literature class, and in more advanced language classes. However, critical elements of readers' workshop can and should be applied to all content areas and courses where reading from text is a central means of conveying content.

Regardless of setting, whether literature or science class, the reading process requires three basic elements: time, ownership, and response. We will examine each of these elements in brief to see how they contribute to reading comprehension.

Part B

Time

Reading time, the most precious commodity for improving reading, is too often the rarest of resources. Given the preponderance of evidence extolling the virtue of time spent reading, acknowledging it is the single best way for readers to become better readers, adopting instructional approaches that increase time spent reading should certainly increase student's ability to benefit from reading instruction. However, for reading time to be time well spent, some specific goals for reading need to be clearly stated.
The most critical literacy goal is creating lifelong readers. All indicators suggest we are not meeting this goal for large numbers of students. In 2004 the National Endowment for the Arts (NEA) published "Reading at Risk." This survey of 17,135 people concluded that traditional reading in America is in sharp decline. As evidence, only 56.9% of survey respondents read a book of any sort during the previous 12 months, and only 46.7% of adults reported reading literature for pleasure. More alarming, the biggest decline in reading occurred among 18-to-24-year-olds. This is the age group most recently out of school, and for black adolescent males, the picture is even more disconcerting—large segments of this population tend to disregard reading altogether (Tatum, 2005). Once out of school, people make their own choices about what is entertaining, how to gather information, what intellectually stimulating activities to pursue, and whether or not to be curious. Away from school for reading to be a viable option, it has to have a well-storied past. Prospective readers will choose to read if they know by going to that well, a thirst will be quenched. This is more likely to happen if reading experiences have been joyful, enriching, social, self-rewarding, absorbing, successful, and/or stimulating. So our goals beyond spending time reading ought to include creating reading experiences that are personally enriching, certainly social, potentially self-rewarding, absorbing, joyful, and always successful. Increasing reading time is a necessary but not sufficient condition for the creation of lifelong readers. Certainly, time devoted to readers' workshop should be sufficiently frequent, consistent, and dependable for students to anticipate and plan purposively for reading. What matters as well, though, is providing reading experiences that develop intrinsically motivated readers, students who come to think of themselves as readers.

Ownership

So often, students are handed textbooks and told what to read, how many pages to read, and by when. Seldom do students have real choice over what they read and for what purposes. When students read only the selections of others and for external purposes, they are less likely to read with engagement. This leads us to conclude that, left to their own devices, students will avoid reading and certainly will eschew good literature. Yet when offered good literature with passion and an understanding of interest, students do choose good literature, and they will choose to investigate topics in science, history, and math. This should not be surprising. As Steven Stahl (1999) wrote, "Most instructors agree that learners place more belief in knowledge they have discovered on their own than in knowledge presented by others, yet all too often, these same instructors fail to trust students to learn anything not explicitly stated by the instructor" (p. 1). When given some choice and voice over what students are reading, they are willing to explore a variety of genres voluntarily. Taking ownership is the first crucial step readers take to becoming invested, inquisitive readers.

Response

We have come to consensus that reading is a social act and not an individual process of learning skills followed by engaging in the isolated chore of reading. Fluency, we now understand, is simply the capacity to apply a skill sequence with minimal errors. Now, we believe that reading is better understood as applying
complex skills that enable a conversation between an author and a reader where the construction of meaning is the outcome of the conversation. For meaning making to be contextualized and placed in long-term memory, it is critical to provide opportunity for genuine response. Responding to text within a social context energizes readers to modify, evaluate, and then locate their understandings in a viable, memorable, and accessible form. Response comes when readers tell others about what they have read and what it means to them. As adults, we delight in telling friends about the good books, interesting articles, and informative pieces we have read. When sharing, we are recalling and rephrasing ideas in our own words as we learn about new sources of ideas, new ways of thinking about the world, and new paths to discovery. Adults do this spontaneously, as do good young readers.

In a moment, we will turn to an explication of readers’ workshop. Before doing so, turn to your dual entry diary and briefly review your entries. Then, with a partner, share your entries, using this exchange as the beginning point for a comprehensive discussion about the reading process. Share your own reading history and how it has served or disserved you in your own life. It is always fascinating to learn the varied histories of other readers. Spend time listening to these tales, as they are almost always instructive about how we do or do not become avid, capable lifelong readers. Remember now to return to the paired reading paired summaries activity.

READERS’ WORKSHOP

Next, we will work through a readers’ workshop experience. We use as our guide the exceptional work of Nancy Atwell (1987) and strongly encourage reading her excellent book In the Middle. Let’s begin. To participate in readers’ workshop, have available a book of your own choosing, as you will be reading for 20 minutes. Once you have selected your book, perform a quick evocation activity: Read anything written about the book or author on the dust jacket, the preview, any chapter headings, or the table of contents. Speculate for a minute about the text, what the text might be about, who the characters might include, how the text will unfold. After this evocation speculation, you will read your chosen book silently for 20 minutes. After reading, you will write a brief response. Be prepared for your response to be shared in small groups of three or four. To prepare, keep in mind several important ideas regarding your response:

1. Each response should be a personal reflection, not a retelling; it should interpret the reading meaningfully in terms of your own experiences and beliefs.

2. Consider your responses as the beginning of a dialogue.

3. Your responses should include some evaluative statements such as “I like this book because . . .” or “This article is effective because it clarified . . . for me” or “I do not think I agree with the author because . . . .”

Sample responses from students may serve as a guide. Samantha (Grade 8) wrote the following:

*This book was hard to put down because something was happening all the time. I could relate to the main character because she is a lot like me. What I liked most*
though is that all the characters are real to me. No one is too weird or has some super-power or something stupid like that. I could just get into all of the characters.

Bryan (Grade 6) wrote the following:

It was sad when the boy died in the story. I guess I knew he was going to die but still I did not want him to. I wanted someone to find a cure even though I knew it wouldn’t happen. I think everyone did the best they could to help, even Michael Jackson. Ryan was brave—everyone should read this book.

Peter (Grade 7) wrote the following:

I do not quite understand how Steve and John got into so much trouble. I don’t think the author did such a good job of explaining how that could happen. It kind of ruined the story for me because it just seemed stupid all the time that they were in trouble when they didn’t need to be. I thought about reading the first part over to see if I missed something but then said no. Now, cause I am writing this I think I should read it again. That might help me like the book more or maybe make me just start a new one I’d like more.

Now, begin your first 20 minute reading. When finished reading, take about six to eight minutes to write your reading response. Then, form pairs or small groups of three or four and allow time for sharing. First, though, since this is the first readers’ workshop sharing, your colleagues will likely be unfamiliar with the reading material being shared. Therefore, at this point in readers, workshop, each reader needs to provide a brief context for the reading, such as the title, author(s), and a few words about the topic or story line before sharing written responses. Later, sharing will build on this information so less background is required.

Quick Reflections

In keeping with our customary practice, take a few minutes now to think and share your thoughts on this reading experience so far. Think about the following:

- How you approached reading knowing you would be sharing your thoughts
- How you responded to the sustained reading time
- What you experienced in the sharing groups—how it went, what you learned, and how you felt, that is, what was the impact of sharing your own reading with others?

THE FOUR CORNERSTONES OF READERS’ WORKSHOP

Let’s now proceed with readers’ workshop.

Readers’ workshop is composed of four primary activities:
1. Mini-Lesson

While we want students to read as much as possible, there is much we want and need to share, then the mini-lessons are a mechanism by which much instruction is accomplished.

Mini-lessons are short, targeted lessons, addressing particular ideas or topics of which we want students to be aware. There are three categories of mini-lessons: procedural (describes how readers’ workshop is conducted), content focused (addresses the elements of narrative and expository text), and process focused (the processes of reading, inferring, predicting, presentations about authors or writing techniques, and also may include reading aloud to the class).

Mini-lessons typically come at the beginning of the class and last a few minutes to 10 or 15 minutes. The inspiration for mini-lessons comes from multiple sources. There are mini-lessons explaining readers’ workshop procedures so students will know how to proceed, those that share important ideas about reading and writing that respond to students’ interests, or topics that emerged from student-survey results or expressed interests or needs. Mini-lesson topics may relate to something the teacher has noticed about student-reading activities. For example, a teacher might observe students selecting only one genre. A mini-lesson about different genres and their structure and importance may be an appropriate response.

The list of possible mini-lesson topics is lengthy and may address something in particular students should look for as they read: the use of adjectives, whether a book is written in the first or third person, plot twists, character development, how to select books of interest, kinds of writers, discussion about a particular author, how to use the library, or Internet to access reading material. At the beginning of each instructional period, mini-lessons are quite frequent but become less frequent as the year progresses.

Usually, the school year begins with a mini-lesson describing how the class will be structured, the rules for readers’ workshop, and expectations for students and the teacher. Evaluation procedures are discussed so students understand how their progress will be measured. It is common for teachers to survey their students about reading to learn their attitudes toward reading and what they know about books and authors.

Since readers’ workshop sometimes involves writing about reading, a mini-lesson on writing responses to reading should be delivered early in the school year. Students unfamiliar with readers’ workshop will not know what or how to write about their reading. Since they will begin to experience reading differently, their response will no longer be restating what the author said or presenting basic facts but rather writing about their own reactions to text; what they noticed about the writing, story line, or characters; what they liked about the book or author and why; or how the content relates to what they already know. To respond well, they will need examples of responses and some modeling.

2. Reading

The best way to promote active reading by students is to provide opportunities for sustained silent reading. Students come to value what their teachers value. They understand that time is valuable so what we chose to commit time to ought to be what we most value. When reading is an add-on activity or something to do later, students assign it less value. They begin to expect less from their reading experience
and benefit less as a result. Readers' workshop incorporates dependable, predictable opportunities for sustained silent reading. Students are able to anticipate reading time, prepare for reading, and anticipate that reading is expected for the entire reading workshop time.

Fifteen minutes is usually long enough for reading in the beginning. As students grow accustomed to reading independently, this time is gradually increased to 30 minutes or more.

3. Conferencing

Reading conferences are conversations between teacher and student. A conference always includes discussion about the text the student is reading and the student's reactions to his or her reading. It may include reading part of the text orally to check difficulty level or to assess oral reading fluency. Through conferences, reading becomes social, as teachers demonstrate interest in student reading, provide encouragement, expand student awareness of literary elements, and provide opportunities to assess student reading comprehension by asking students to respond to what they have read.

Some suggested conference questions include the following:

- Why did you choose this book?
- Tell me about the book. What part do you like best? Why?
- Tell me more about it. Read the part that is most exciting.
- What parts are unclear?
- How did you feel when this happened?
- What did you think when this happened?
- How can you find out more about your topic?
- What have you learned from this book?
- What problems are you having? What problems did you have?
- Do you feel comfortable with the difficulty level of the writing?
- What questions would you like to ask me? How can I help you?
- What is the story problem of this book? How is it being solved?
- Do you know any other books by this author?
- Were there any words that were unfamiliar? How did you handle them?
- How do you like the subject matter? Is it an area of interest for you? Is this the first time reading about this topic, or are you already familiar with the topic?

Conferencing typically takes place during silent reading time. Each classroom handles conferencing differently according to the number of students and the physical arrangement of the classroom. Conferences usually last three to five minutes per student, allowing time to meet with three to five students during readers' workshop.

One method of managing readers' workshop is for the teacher to move about the classroom with a chair, randomly selecting students for conferencing. The chair keeps the teacher at eye level with students, establishing a more relaxed conference atmosphere. It is important that conferences avoid becoming mini-evaluations. It should remain a dialogue between two readers about reading, with the student doing as much talking as the teacher.

Another way to conference is to have students come one at a time to the teacher's desk or other designated location in the classroom. This may be less disruptive than
the teacher moving about the classroom. If students come to the teacher’s desk or a table in a corner of the room, students should sit beside the teacher rather than across from the teacher. This contributes to the relaxed nature of conferencing by maintaining the sense of partnership.

**Tips for Successful Reading Conferencing**

1. Conferences are designed to be relaxed and informal. Since the other students are reading, it is important to speak quietly. Interruptions during conference time are strongly discouraged. Students not conferencing are instructed to ask questions only during the brief breaks between conferences. The teacher-student relationship during conferencing is one of mentor and partner. Students are conferencing to build on what they know and understand about reading and the text they are reading at the time and to demonstrate their reading capabilities so jointly they can decide what is needed next to continue to grow as a reader.

2. Students must have reading material of interest and at an appropriate reading level. Interest can be generated by learning about your students’ lives and inclinations and selecting books that connect to their world. Book talks introduce students to books they might never consider but would enjoy if exposed. Book talks also escalate the quality of literature children select by exposing them to the story lines of great books they might otherwise avoid.

3. During readers’ workshop, the room must be quiet with no disruptions and no talking—only reading. Establish strict rules about this and enforce them.

4. Everyone in the class must read. Even the most reluctant readers will read if they have a book they have selected and enjoy and expectations for reading are clear. Even students who are resistant in the beginning begin to look forward to the reading and conference time.

   The most rewarding outcome of individual reading conferences is the warmth and understanding that develop between the teacher and students. Students’ interests, reading needs, and beliefs about themselves as readers blossom through these interactions.

5. The dialogue between the teacher and the student depends on where the student is in his or her reading at the moment. When a student begins a new book, it is useful to have the student orally read a selection from the book to check for difficulty. Some students like to conference each time they read. Be flexible and schedule the conference times according to students’ and teacher’s interests and needs. Keeping track of conferences through careful notation on conference cards is a critical management tool. These notes serve as a helpful guide to subsequent conferences. Conference cards are short forms that document the content of the conferences, topics covered, student responses, reading selections, teacher observations, and anecdotal notes.

6. Use a section of the chalkboard to list those students who will have reading conferences that day. Schedule them on the basis of
   - interval between conferences,
   - book completion,
• student request, or
• teacher interest in a particular student’s reading activities.

On another section of the chalkboard, list those students not scheduled but who wish to have a conference for their own reasons. After the scheduled conferences and as time permits, meet with students who have signed up. Any students who wanted a conference but did not have one because of time constraints can be scheduled the following day.

4. Responding

Just as students need time for reading, they need time to respond, time to integrate what they have read into what they already think and believe, and they need time to savor their literary experiences. This is understandable for literature study but perhaps less transparent for content study. But when reading is one of the primary means of changing student thinking or increasing knowledge, reader response is an essential part of the teaching-learning process. There are numerous ways students can respond to reading. Later in this chapter, two reader response approaches, Questioning the Author (Beck, McKeown, Hamilton, & Kucan, 1997) and Literature Circles (Short & Kaufman, 1995), are presented. However, first, we will look at reading class activities before examining content-area reading. Conferencing is one means of providing students with opportunities to reflect on and respond to reading. However, conferences are brief and often have multiple agendas, limiting opportunities for responding. Responding to reading is more fulfilling if it resembles more of a sustained dialogue, either oral or written, and occurs student-to-teacher, student-to-student, and within groups.

LITERARY LETTERS

Student-to-student response is critical and can occur on several levels. One way for students to dialogue is through literary letters. These are brief, thoughtful, personal responses to reading intended to stimulate dialogue between two readers. Students will often send letters to introduce friends to a new book or converse with others reading the same book, reading about the same topic, or reading another book by the same author.

Literary letters are often spontaneous, reflecting students’ thoughts immediately after they read. They often contain spelling and grammatical errors, and because they constitute writing for thinking and are not intended for wider publication, spelling and grammatical errors are not considered important but simply a reflection of the early stage in the writing process.

BOOK TALKS

Another means of responding to reading is called book talks. Book talks are usually short explanations delivered by a student or teacher about a particular book. It usually involves speaking to the entire class and is a means of introducing a new book or author to the group. Book talks are frequently scheduled at the end of readers’
workshop and take about 10 to 12 minutes. This allows time for one or more students to say something about their reading and time for members of the group to respond.

Book talks are an excellent way for students to hear about books their peers are reading and enjoying. They create excitement about reading and provide students with language to express what they understand, how they connect, and their own feelings about what they are reading. It also helps create a community of readers who understand, appreciate, and apply the reading process. It helps students understand that the reading process is not completed when the act of reading is finished; rather, it is completed only when readers have thought about their reading and expressed their thoughts in some form.

There are some important roles for students to understand when holding book talks. These roles are (1) the sharer and (2) the audience or listener. The sharer is the person who will provide the book talk, and the audience includes the sharer’s classmates and the teacher.

The sharers should be prepared to

- tell the title and/or author,
- briefly tell about the book or story explaining what happens,
- pick important parts to share,
- choose a favorite part to read or share,
- tell why they chose the book, and
- tell why they like the book or a particular character, topic, line, quote, or idea from the book.

The audience or listeners should be prepared to

- listen,
- say the person’s name, then
  - tell what they liked about how and what the sharer talked about,
  - ask what kind of book it is,
  - ask why it was chosen,
  - ask to hear more about it, and
  - tell what it made them think of (some other book; something that has happened to you), and
- use “I like what you said . . .” or “What I found interesting. . . .”

Keeping Track of Reading

An important part of readers’ workshop involves students monitoring their own reading activities and progress. Self-monitoring and self-evaluation are important steps for students to take as they become independent learners. They can become proficient, insightful, thoughtful, realistic appraisers of their own development if they are given the opportunity and the means for self-evaluation. This does not mean teachers forsake their responsibility for assessing student progress. In fact, providing honest feedback to students about their academic development is a crucial role for teachers.
Sample Self-Monitoring Goals

- Number of books read
- Frequency of book starts
- Number of books and number of chapters
- Number of book talks lead
- Frequency of literary letters

READERS’ WORKSHOP RULES

There are rules that guide readers’ workshop, which should be shared with students and posted in the classroom, so students will be clear about expectations. They include the following:

1. You must read the entire time.
2. You may not disturb anyone.
3. No bathroom breaks or drinks are permitted.
4. Choose a book or reading material before readers’ workshop.
5. Listen during mini-lessons.
6. Be ready to share when asked.
7. Sit anywhere you are comfortable.

SUMMARY OF READERS’ WORKSHOP

Good readers are thoughtful readers. Our goal for reading is beyond fluency to critical, thoughtful reading and to satisfying cases of interestedness, mild or severe. Reaching this goal requires immersing readers in the reading process so readers have opportunities to read in a thoughtful setting where they are exposed to a variety of reading materials for self-selection and have opportunities to correspond with those modeling a love of reading. We know when students take ownership of their reading, the rewards for reading become internalized. Readers’ workshop orchestrates a process of shifting the motivation for reading and learning from an extrinsic to intrinsic locus of control, for in the final analysis, what we hope for our students is that they develop an internal drive to read and learn that carries them well beyond the classroom.

ANALYSIS OF READERS’ WORKSHOP AND THE ERR FRAMEWORK

Now that you have reviewed the readers’ workshop process, look at your journal entry. Think now about how readers’ workshop and the ERR framework coincide. Share thoughts with a partner.
It is probably evident that the overall structure of readers’ workshop closely parallels the ERR framework. At a global level, the mini-lesson to begin the workshop serves as an evocation process. Whether procedural or literary in nature, it prepares students for the reading process and sets purposes for the reading to come. The sustained silent reading time is coincidental with the realization of meaning phase, and responding to reading is a reflection-stage activity.

Beneath the global structure, there is much about the readers’ workshop process that embodies the framework. Once students are actively engaged in readers’ workshop, they are engaging continuously in the various stages of the framework. Sending literary letters to one another or completing their reading journals engages students in an ongoing walk through the three stages of the framework. Their discussions take the form of both reflections and evocations. Reflections of their recent reading are transformed through dialogue into evocations about future readings. At the dialogue level, their writing serves as the content, representing valued thoughts about their reading and is indicative of the realizations of meaning phase. Students’ dialogue then becomes a mechanism for monitoring how well, how frequently, and how actively students are engaging in various phases of the reading process.

CONTENT READING AND READERS’ WORKSHOP

Recent national and international assessments document the decline in American students’ content or disciplinary reading abilities (Shanahan & Shanahan, 2008). Students, particularly in middle and upper grades, are failing to comprehend content texts. Even though students read the text, they appear to derive limited benefit from their reading, as the misconceptions, misunderstandings, and information gaps they held prior to their reading remain intact after reading. The absence of thoughtful reading of content text has reached the level of a national emergency. Shanahan and Shanahan offer this gloomy assessment. They write, “American high school students cannot read at the level necessary to compete in a global economy, and many are likely to have difficulty in taking care of their health needs (Berkman et al., 2004) or participating in civic life . . .” (p. 42).

Our most recent example of readers’ workshop was intended for implementation in a literature or reading class. This was done intentionally as it is important for content teachers to understand how the workshop engages readers thoughtfully at all stages of the learning process. It is also intended to emphasize the role of time, ownership, and response in any reading exercise, so it is clear these elements should also be planned into content or disciplinary instruction. Furthermore, as recent investigations by Shanahan and Shanahan (2008) suggested, reading demands, the types of reading required, and the skills sets necessary for successful text comprehension vary by discipline. Consequently, no single set of strategies will meet all readers’ needs across disciplines. Disciplinary literacy, then, requires composite approaches defined in part by the discipline itself and by instructor purposes and learner outcome expectations. Discipline-specific instruction, then, necessitates teachers knowing about various strategies and what they enable students to do, how they promote thinking, and what type of thinking they encourage. With this more in-depth knowledge of the tools of instruction, teachers can knowingly select the tools that will best lead students to the desired learning outcomes. In the following section, more specific applications of the reading process to content reading are presented to facilitate thoughtful study of content.
APPLYING THE READING PROCESS TO CONTENT AREAS

Consider now how you might apply readers’ workshop to a content lesson. With a partner, pick a topic and text and consider how to apply readers’ workshop to the lesson.

Reading in Content Areas—Setting the Stage

One of the most difficult aspects of planning for student reading of content text is determining the purpose for reading a selected text and the most important outcomes expected from student reading. Often, we let students guess what is most important or what the teacher expectations are. This works well for students who guess correctly, those who are self-motivated, or those who already have an interest in the topic. For others, this approach leaves them confused, unsure, or unmotivated. The first task we have as teachers is to prepare or set the stage for students to read content text. A few steps for accomplishing this include the following:

1. Having a well-articulated content-based purpose for reading text
2. Presenting essential vocabulary that may be unfamiliar
3. Determining how the text will be used to support instruction
4. Encouraging student predictions about content
5. Activating students’ prior knowledge of related content
6. Stimulating content-related discussion
7. Considering the concepts required for understanding the objectives of the reading task and checking to see if students have sufficient prior knowledge to understand these concepts
8. Making connections through discussion and developing relations between this content and previous content
9. Explaining clearly expectations and learning objectives for the reading task
10. Developing a sense of questions to guide thinking to higher levels of thought and ultimately to judgments and applications

Reading in Content Areas—Questioning and Discussion

As we have discussed in previous chapters, questioning plays a central role in the thinking process. The kinds of questions students are asked influence the kinds of content-related thinking students perform. In Reading and Learning in Content Areas, Ryder and Graves (1994) offer a series of question categories to guide students’ content reading. They suggest questions that accomplish the following:

1. Highlight lesson content. Use questions or guides to direct student attention to specific text-based information. Example:
   - In science—be sure you understand the process of homeostasis
   - In art—be sure you understand the differences among color, hue, and color saturation.
2. Integrate lesson content with previously learned material by using questions to connect previous content with new content material. Example:
   - In science—be sure you understand the effects of aging on homeostasis.
   - In art—be sure you understand why the various levels of saturation evoke different types of emotional reactions.

3. Structure higher-level understanding. Provide questions that lead students toward applications of the information to novel situations or contexts. Example:
   - In science—how can our knowledge of homeostasis help us understand the functioning of the circulatory system?
   - In art—what colors would you select for your opponents’ pregame locker room?

4. Promote integrations of students’ experiences, values, cultural backgrounds, and knowledge with the new learning experience. Ask questions and guide discussion that encourages students to build their own understandings of the text out of an acknowledged set of understandings. Example:
   - In science—be sure you understand the process of homeostasis.
   - In art—be sure you understand the differences among color, hue, and color saturation.

5. Integrate lesson content with previously learned material by using questions to connect previous content with new content material. Example:
   - In science—how is homeostasis influenced by geographic region, environment, and culture, and how does that relate to your life and life-style?
   - In art—certain cultures use different levels of color saturation in their clothes. What are the traditional ancestral colors of this region?

When promoting content-based discussion and asking guiding questions, it is good to keep a few things in mind. First, the conversation should stay focused. The teacher’s task is to understand the main objectives of the lesson and what student outcomes are sought. Conversation should center on the main objectives. However, teachers must listen to their students to understand what is behind their thinking rather than considering only what is in their own minds. Too much teacher control will inhibit student thinking and prevent their thinking from coalescing around a topic. Students should be encouraged to engage in speculative thought. Second, discussion is intended to elicit multiple ideas and perspectives and should include as many students as possible. Connections between various student ideas should be emphasized. Third, adequate time should be allowed for students’ questions and responses.

**APPLYING READERS’ WORKSHOP PROCESS TO SCIENCE**

As a practical learning task using the following text on geology, let’s look at how all this fits together. During the next 30 minutes or so, you will read and prepare a lesson applying the four components of readers’ workshop (mini-lesson, reading, conferencing, and responding.) First, read the text and determine the objective of this
lesson—that is, what you want your students to know and be able to do after they have read the text, not only now but, say, five years from now. To set purpose and objectives, divide into small groups at random and without regard to grade level or content area. As a group, determine objectives for the lesson, write them down, and use them to guide throughout the lesson. Read the following text (Wolfe et al., 1971) now.

Folds

You have learned how rocks crumble and decompose when exposed to air and water. The products of this weathering are transported by streams and other agents of erosion. Eventually, the fragments and solutions that result from weathering of old rocks are deposited as sediments. If these layers of loose materials are later cemented together, they become sedimentary rocks.

The best evidence of crustal movements is to be found in sedimentary rocks. Sediments are almost always deposited in horizontal layers. As a result, sedimentary rocks should be found in horizontal beds, or strata. Yet layers of sedimentary rocks are often found tilted far from the horizontal. What could happen to rock layers to produce a fold?

It seems obvious that the rocks must have moved in response to pressure. You can model this for yourself by pushing from both sides of a stack of paper. The paper will adjust to the pressure by bulging up into a fold. Similar results are achieved by using clay or other materials that make a more realistic model of rock layers. In clay models, breaks and fault movements are often seen among the folds. Such faults are commonly found in folded rock layers.

Over a large area of land, the layers are often crumpled into a series of folds. The layers rise and fall, much like a series of waves. The upfold is called anticline, the downfold, a syncline. A step-like fold is called a monocline.

You may be wondering how it is possible for a brittle solid, such as rock, to fold. You know from your own experience that you cannot squeeze rocks and change their shape. You have read, however, that rocks below the surface become warmer with depth. They are subjected to enormous pressure from the weight of overlying rocks. Under these conditions, solid rock may react plastically (like putty) to pressure. Most folding apparently occurs in sedimentary rocks that are not fully cemented. The entire process, however, by which various kinds of rocks fold is not clearly understood, and much research remains to be done.

Geologists once believed that folding was caused entirely by horizontal pressure, or compression. Recent experiments have shown, however, that all kinds of folds may develop in layered material around the edges of a rising mass as it pushes upward. When masses of heated rock below the surface expand and push up, overlying rock layers may fold and slip to the sides. Similar features form when masses of salt are pushed up to form salt domes. Salt is a very light mineral. Under pressure at depths, a horizontal layer of salt may bulge and be forced up through the rocks like a bubble rising in water.

Many of the mountain ranges of the world are made up of tremendous thicknesses of sedimentary rock. In some mountains, these rocks appear to have formed from a series of layers of sediments as much as 9 to 10 kilometers thick. Careful study of these rocks shows that the sediments must have been laid down in a large trough. Apparently, the bottom of the trough sank slowly at a rate of about 200 to 300 meters each million years. In most places, the water in the trough appears to have been less than 300 meters deep. Such troughs may be hundreds of kilometers long and tens of kilometers in width. The San Joaquin Valley (The Great Valley of California) is a modern example of such a trough. Such slowly sinking troughs are called geosynclines. Smaller folds are developed in the layers of a geosyncline as it sinks, dragging the rocks downward into the trough. (pp. 162–164)
Now that you have read the article, proceed to develop your plan. When they are complete, share with others. Your plan should address each of the four components.

- Mini-lesson
- Reading
- Conferencing
- Responding

So when developing the plan, attend carefully to the various ways the components are incorporated into a lesson. Only after you have completed your plan, review the following sample lesson using the “Folds” text.

**Sample Lesson**

As lesson objectives, students should know the following:

- How geology might influence where and how people live
- What sedimentary rock is and how it changes shape
- How pressure and heat cause rock to change shape to form different land masses
- How sedimentary layers are formed

**Mini-Lesson**

Share with the class the vocabulary words they will need to know to understand the text. This is often a difficult choice. Some teachers are inclined to choose the most difficult words or those specific to the content area—the technical terms. These words may in fact not be important to know at all. In the “Folds” passage, the vocabulary words most useful for the students to know before reading include the following:

folds  layers  trough  crustal movement  pressure

This selection of vocabulary words may seem surprising, but three thoughts have guided the decision process. First, consider what we want students to remember about this lesson five years from now. What knowledge is most relevant to them? Second, select words that are foundations for the important concepts we wish to develop. Third, examine the text and determine which terms are clearly defined within the text. In the “Folds” text, some might select sedimentary, anticline, syncline, monocline, and geosyncline. Yet all these terms are clearly defined within the text. Furthermore, these words are technical terms used by geologists. They are not terms people typically use to communicate their understanding about geology. For those who wish to become geologists, these terms are important and will become a routine part of their vocabulary later. For eighth graders, they are only tangential to long-term understanding. Yet by providing readers foundational vocabulary that facilitates understanding of the text, students are more apt to recall the technical terms as well, as they will have more cognitive resources available to attend to these terms.

Begin the mini-lesson by asking students what they think about when you speak of land formations. Following a few responses, begin a brief discussion about land formation and how they influence where and how people live. With this background
now, share photographs of various kinds of land formations: mountains, canyons, fault lines, or other large geological formations. Center discussion on how these land masses were formed. Review and discuss what students have learned already about this and ask them to consider how the land formations represented in the photos might have come to look as they do.

Encourage students to generate questions of their own before they begin reading. These questions and the identified and defined vocabulary words should be put on the board with instructions for students to link the text to the conversation as they read. Students can now begin reading the text.

Reading and Conferencing

For this lesson, conferencing is handled differently from what is typical of readers’ workshop. First, have students form small groups of four or five. As they read independently, move from group to group checking for understanding. Ask students in each group if they are having any difficulties with the text or if they have questions. One or more students might read a paragraph aloud to the group. The teacher should also begin to build on the model of crustal movement by asking about other ways the earth’s motion causes land formations. Encourage students to think about various models that they could create to represent the formations discussed in the text. Since this kind of conferencing takes time and the text is short, students in the other groups should be instructed to begin responding to the text within their groups as soon as they are done reading.

Responding

Having been instructed how to proceed before beginning to read, students now discuss first their thoughts and speculations before they read the article and then discuss how their speculations coincided with or were contradicted by the text. They then should work together to develop a model on paper, which would demonstrate formation of one of the geological structures described in the text. Encourage students to respond in their content journal by writing responses to the lesson’s objectives (provided at the beginning of the class) using the vocabulary terms identified. Responding in their content journal would end this lesson unless the results indicate confusion or misunderstanding. Reader responses can be extremely informative about student understandings. If confusion or misunderstanding exists or persists, then further discussion is warranted.

READING IN CONTENT AREAS—THE LINK TO MATH

Best practices in math instruction have moved beyond the notion that computational practice and drill are the heart of math instruction. Mathematicians now emphasize that computation, like knowing how to read, is only the beginning of the math process. Mathematics teachers appreciate the instructional value of presenting students with relevant, complex mathematical problems, for which the solutions resolve real problems in concrete ways. National math standards (see NCTM Principles and Standards for School Mathematics at http://standards.nctm.org) emphasize the study of relations between various mathematics concepts rather than merely being able to compute accurately.
MATHEMATICS IS MORE THAN
A COLLECTION OF CONCEPTS AND SKILLS

The National Council of Teachers of Mathematics (NCTM) has proposed a series of standards for mathematics instruction based on reconsiderations of what mathematics is and how it should be conceptualized in the classroom. They offer several recommendations:

NCTM goals for all students include the following:

To learn to

- value mathematics,
- communicate mathematically, and
- reason mathematically.

To become

- confident in their ability to do mathematics, and
- mathematical problem solvers.

Mathematical experiences should foster

- the disposition to do mathematics,
- the confidence to learn mathematics independently,
- the development and application of mathematical language and symbolism,
- a view of mathematics as a study of patterns and relationships, and
- perspectives on the nature of mathematics through a historical and cultural approach.

Mathematical tasks should

- integrate mathematical thinking with mathematical concepts or skills,
- capture students' curiosity,
- invite students to speculate and pursue their hunches, and
- test skill development in the context of problem solving.

NCTM also proposes consideration of four basic assumptions about teaching mathematics:

1. The goal of teaching mathematics is to help all students develop mathematical power.
2. What students learn is fundamentally connected with how they learn it.
3. All students can learn to think mathematically.
4. Teaching is a complex practice and hence not reducible to recipes or prescriptions.

Finally, NCTM describes a revised computational model consistent with the ERR framework and the conceptualization of teaching and learning embodied here. NCTM promotes the following:

- Classrooms as mathematical communities
- Logical and mathematical evidence as verification
- Mathematical reasoning
- Conjecturing, inventing, and problem solving
- Connecting mathematics, its ideas, and its applications

CHAPTER REFLECTION

Central to this chapter is the idea that reading, whether narrative or content specific, must become its own reward if we are to successfully develop lifelong readers. There are paths to accomplishing this vital goal. Evidence suggests (Gambrell & Marinak, 2009) that one key to developing self-motivated, lifelong readers is by providing authentic literacy tasks. Another key is providing choice, and a third is providing proximal (reading-related and reading-valued) rewards for reading. Readers’ workshop, whether delivered as a part of a literacy course or in content study, offers opportunities for all three “keys” to intrinsic reward.

Earlier, we cited Nell Duke’s (2003) research on the prevalence of narrative text and the dearth of experience with informational text and other genres in early reading. She stated the belief that this was a “missed opportunity to better prepare children for later schooling” (p. 1). She suggested informational texts have to combat a reputation for being inherently boring. In this chapter, you experienced various approaches to reading intended to connect readers to reading content regardless of genre. In earlier chapters, you read a variety of texts, some informational and some narrative. With each reading, readers were drawn into the text. Remember how our tearful mother sea turtle laid her golf-ball-size eggs into a tiny hole in the sandy beach, not once but several times yearly, while the males hung out at sea. Recall in “The Sniper,” the sights, sounds, and smells of war shattering the serenity of the Irish dawn. As Duke (2003) asserted, our kids are growing up in the information age, and most of it is fascinating, so let’s go exploring.

In content-related pairs or small groups where possible, consider for a moment your present or future classroom content. Imagine this content and the various sources and resources available to you from narrative and informational text to electronic media. With all these resources in mind, outline a coherent study sequence, utilizing a blend of genre and media that guides readers through these various mediums while simultaneously guiding them through the three-phase learning framework (ERR). This will take some time to accomplish. Allow 20 to 30 minutes for this once materials are gathered. To make this activity useful and more purposeful, work from genuine content materials and resources.

After you have completed your plans, share them with other content-area pairs or groups. Note how the various resources are integrated and check to see that the lesson is coherent and successfully falls under the ERR umbrella. Coincidental with this conversation, address as well the various strategies and methods presented in this chapter and how and where they fit within the ERR framework. Also, consider what types of questioning you might use to guide text exploration or discussion.
Learning to Write, Writing to Learn

Students need to tell each other and the world what they know—in order to find out what they know. Through the telling, they will learn. Through the telling, they will interpret the world as they see it to the rest of us.

—Judith Renyi

EVOCATION

This chapter will explore approaches to learning to write and will address writing in content or discipline areas. The approach to writing presented here is a process writing approach based primarily on Nancie Atwell’s (1987, 1998) writer’s workshop, Lucy Calkins and Shelley Harwayne’s (1992) work with workshops and mini-lessons, and the work of James Moffett (1968). Recent reviews of research on writing and writing instruction (Coker & Lewis, 2008) support a process writing approach, especially when accompanied by well-orchestrated, professional development for all teachers, including discipline-specific teachers. We are especially supportive of this as we believe writing to be a powerful tool for learning in all content areas and believe it essential for content teachers to understand process writing and how to effectively incorporate writing as a tool for learning into content classroom instruction.

Before taking a closer look at writing, it will be helpful to take some time to examine your own recent writing experience. Throughout this text, you have been asked to engage in a variety of writing tasks across all phases of the ERR framework. For example, you have been keeping a journal, clustering, writing for cubing, and freewriting. Think for a moment about these writing experiences. Ask whether and how these writing activities have contributed to your own learning during this
professional development sequence. Ask if there are some writing strategies that have worked better for you and others less beneficial. Jot down a few notes in your journal; then share with a partner and finally with the larger group. Conclude with a general discussion about how writing has been incorporated into this text and whether the approach offered here is generalizable to other content-area teachers.

Once you have shared, we will look first at some issues related to writing in U.S. schools, the value of writing as a learning tool, and what recent research suggests are more effective ways of teaching writing and incorporating writing into content instruction. As you begin reading this portion of the text, recall your own experiences with writing, both in and out of school, as a tool for learning and thinking as well as your present use of writing for thinking and learning in your teaching. This thinking will be informative as we move to the final sections of this chapter, in which we present writer’s workshop based on Nancie Atwell’s (1987) model. This will provide a step-by-step model of process writing that can be applied immediately in your classroom and will be infused with your own insights into the writing process as you have experienced it.

OUTCOME EXPECTATIONS

At the conclusion of this chapter you should be able to do the following:

- understand that writing is best understood as a process, and this understanding is well supported by research on learning to write and writing to learn and understand, as well, the power of writing for thinking and learning;
- recognize that thorough knowledge and application of process writing for content learning is essential for students to benefit from writing-to-learn assignments in the disciplines;
- be prepared to implement writer’s workshop or components of this model in your classroom, including those who are content or discipline specific teachers; and
- use the writing process, including prewriting strategies previously described, to support your personal writing.

WRITING RESURGENCE

Today, we are witness to a global resurgence in writing. Not too long ago, many were lamenting the loss of writing as an active form of day-to-day communication. Telephones and televisions moved oral and visual mediums to the forefront. This has all changed with high-speed, portable, Internet access and software to support texting, Twitter, wikis, Facebook, and blogging. Young people enthusiastically engage in writing, some documenting nearly every moment of their existence.

Some of this writing certainly lacks traditional conventions (texting) while some forms serve as platforms for a variety of writing genres (blogging, wikis, etc.). The volume of writing is staggering as instant communication has evolved to constant communication. Young people rarely speak on their mobile phones, as
texting has become the preferred medium. To offer an example of the proliferation of writing, from 1999 to 2009 Wikipedia articles have grown from a few thousand to over 13,000,000 in 260 different languages with over 25,000 active editors at any given time.

The one place where writing remains a struggle and is less appreciated and more daunting is in school. In school, many students who text hundreds of times daily, often surreptitiously in class, are suddenly at a loss for words. Certainly, content and expectations differ, but people who gravitate naturally toward writing for day-to-day communication should not suddenly be tongue-tied by a writing assignment. Yet they are. The most recent National Assessment of Educational Progress (NAEP, 2007) report estimates 7 of 10 fourth, eighth, and twelfth graders are “low achieving” writers who fail to meet writing-proficiency goals. Of further concern, Coker and Lewis (2008) suggested writing was increasingly playing a gatekeeping role in the workplace. They reported as well that “U. S. corporations spend an estimated $3.1 billion annually to remediate their employees’ writing skills” (p. 234). Compounding remediating student writing deficiencies are two significant writing gaps. One is the broad gap in writing achievement linked to socioeconomic status, gender, and ethnicity. The second is the gap in teacher knowledge about writing reflected in the broad differences between teacher preparation programs in emphasis and perspective on writing instruction.

The contrast between the world of writing outside school and in school may be quite unnecessary. Certainly, among young people, there is an inclination to write when there is perceived value and purpose for writing, an identified audience, or in many instances, a vast social network, all of which seem more than ever to substantiate the core writing components of social engagement and authenticity.

Yet with all this writing, it is clear that skilled writing does not evolve naturally. As Coker and Lewis (2008) concluded,

Research into the cognitive processes of expert writers has clearly demonstrated that effective and skilled writing is neither a natural consequence of language developmental nor an organic unfolding of natural developmental processes. Writing is a complicated activity that is dependent on a rich assortment of cognitive processes and on the social context of the writer. (p. 233)

But how do we move students from the comfort of texting, and other forms of more spontaneous electronic authorship, to academic writing? The transition should be easier today because students already understand the social dynamic involved and the power of purposeful written communication. The task of academic writing then should be to help students realize the joy that comes from what Garrison Keillor has often described in his radio program Writer’s Almanac as the “act of discovery” when engaged in thoughtful writing. Students’ nonacademic writing is typically brief and to the point. Academic writing allows students to explore in greater detail what they understand and believe or think about ideas, concepts, or events. These explorations offer genuine opportunities for self-discovery, which can be exhilarating. Too frequently, the joy is lost as otherwise glib and insightful young people clam up, their writing production suddenly plummeting reduced to formulaic prose and paragraph counting.

Where have we gone wrong? James Moffett (1968) informed us that writing in school should be practiced as it is out of school. Writers need real audiences, real
topics, real purposes, and they need a process for writing that leads them from an idea to a finished piece of written work. Coker and Lewis (2008) drew the same conclusion from their research review, suggesting that writing is a complicated process, and for adolescent writers, best accomplished when combined with multiple approaches grounded within a process-writing model.

So what is process writing? In brief, the writing process involves a series of experiences and opportunities writers work through that takes them from an idea to a final written piece that communicates effectively with readers and typically includes the conventions of writing, as would a publishable piece of writing. Not all student writing progresses this far, but the writing process can take the writer to publication level when appropriate. The experiences and opportunities that typically define the writing process include immersion in a writing community, frequent and reliable opportunities to write, peer and teacher feedback, multiple draft development involving revisions of text, exposure to explicit writing instruction, editing for final drafts, conferencing, and real audiences to which authors might read their final draft or published works.

Relying on Graham and Perin’s (2007) work, Coker and Lewis (2008) encourage teachers to view process writing as an umbrella strategy under which a number of more specialized instructional strategies are applied. Writing research seems to indicate that under a process-writing umbrella, several strategies have emerged as more effectively supporting developing writers. They include the following:

1. Self-Regulated Strategy Development (SRSD), which is itself a process writing strategy involving “explicit instruction in writing strategies and self-regulated methods, mastery learning, and one-on-one instruction” (Coker & Lewis, 2008, p. 237)

2. Collaborative writing, which involves group work at all stages of the writing process

3. Sentence combining or linking sentences together to present increasingly more complex thought

4. Inquiry activities targeted at building in a knowledge base for discipline-specific writing

5. Discipline-specific writing as a means to building content knowledge or for integrating knowledge across content areas

Here, we will present James Moffett’s (1968) conception of the context of the writer, and then, in brief, we will explore Nancie Atwell’s (1987) writer’s workshop as the umbrella process-writing model.

WRITING DEFINED

James Moffett (1968) held that discourse was “a unity—somebody, talking to somebody about something” (p. 14). In Moffett’s conception of written discourse, the writer is writing about something he or she has chosen to write about to an audience, which happens to be interested in what the writer has to say. Viewing writing as such a discourse helps understand the need to inform our students that when
writing, they are engaged in a conversation. They are talking to somebody they can identify about something they care about and are interested in discussing. It is through this realization of engaged conversation that developing writers will begin to see the power of their own writing.

It may be helpful to view Moffett’s (1968) conception of unity as a triangle (Figure 8.1).

![Figure 8.1](image)

With this model, teachers can see the unity of the process and can serve their students well by emphasizing the elements of writer, audience, and subject when making writing assignments. It is helpful to discuss who the audience is for particular works. Often, the audience in a classroom is other students—either as individuals, in small group, or the entire class. Occasionally, it is the teacher. There is perhaps some value in identifying other intriguing audiences, such as a character from history.

In the case of writing for thinking, the audience may be oneself. The author writes to understand, to clarify, to remember, to organize, to sort out thoughts, to reflect, and to communicate understandings. Often, individual writing will be shared in pairs and then with the entire class. We have found that the conversation following writing to oneself to be rewarding, often filled with surprise at the diversity and development of ideas.

Three basic teaching principles guide the creation of classrooms where writing for thinking flourishes. First, writing for thinking is intended to facilitate thinking and is not graded. If writing is to produce a free flow of ideas, writers must write without concern for mechanics and without being judged for either content or form. Sometimes, students, accustomed to being graded, take some convincing before believing their teachers are truly interested in what they think. Of course, writing that has been through the writing process to final draft may be graded. Second,
related to the first but important to distinguish, writers must feel free to take risks. They must believe they can express their thinking freely and that their thinking will be respected. Third, writers must be provided response to the content of their writing, which requires opportunities to share and discuss their writing with others in their writing community.

**WRITER’S WORKSHOP**

**Getting Started**

Before proceeding, stop for a moment to consider what might be the first obstacle you as a writer encounter when preparing to write. Think about that moment when you take pen in hand and stare down at a blank piece of paper or gaze into a blank document on your monitor. When you have in mind one or two obstacles you face, remember and read on. For many writers, unless a particular concrete assignment is provided, the initial obstacle is deciding just what to write about. Finding a topic is fraught with difficulty. Often, writers are stymied by their own filtering system. We eliminate potential topics before they have a chance to prove themselves worthy. “No, that’s not exciting or interesting enough for a reader.” or “Who wants to read about that?” or “I am not a good enough writer to write about that.” All these and more haunt writers’ topic selection process. And then there is the fear factor (see the following) that Stephen King (2000) refers to in his delightful book, *On Writing*.

**The Initial Struggle**

What to write about? Finding a topic, theme, or focus for writing is no simple matter. Many writers struggle to locate an entry point for writing; students surely wrestle with this. Even when assigned a topic, determining how to focus, how to narrow to a manageable degree, is challenging. Often, what inhibits young writers is the belief that worthy writing is always about something grand and glorious or explores some wholly uncharted territory. This, of course, is not the case. What writers write about is what they know about. A 2009 interview in the *Bangor Daily News*, Bangor, Maine, with Pulitzer Prize–winning author Richard Russo exemplifies this truth. Speaking to the interviewer about his latest novel, *That Old Cape Magic*, “Russo revealed that both he and his main character were at the same intersection in their lives when he began writing the book” (Herber, 2009, p. D1). Also, Senator Barbara Boxer has written her second novel. Not surprising, her lead character is a female Senator. Nancie Atwell (1987) speaks to the reality of writing about what one knows about when discussing writers’ need to establish their “writing territories” (p. 120). In presenting her own running list of topics, genres, and audiences as a model for her students, a list of territories she suggests “represents my self-portrait as a writer,” she makes her list “… personal, specific, diverse, and unpretentious …” (p. 120). She then uses her list to stimulate students to generate their own list of writing territories. She does this in conversations with students about how items found their way to her list. They got there
because they represent real experiences, real memories, real interest, real imagination, and dreams. She then invites her young writers to recall out loud stories of their own.

Once writers begin to develop their own lists, it is useful to pair them so they can share their lists and learn from one another. Students then add to their territories lists throughout the school year.

What we typically do with our students, and what we would like you to do now, is to go through the initial steps of the workshop process as follows:

1. Begin developing your own writing territories. Think of topics that might be of interest to you, using some of the prompts shared by Nancie Atwell (1987). Think as well about the genres you are interested in writing in: poetry, letter, short story, essay, newspaper article, or other possibilities. Finally, consider your audiences: students, parents, community leaders, Wikipedia, blog readers, a relative. The list is endless. To help with the topic search think about the following:
   a. What hobbies you have and how you came to enjoy one of them
   b. A special time you spent with a grandparent or relative and what made it special
   c. Childhood memories of family events or gatherings
   d. A hair-raising experience
   e. A scene you witnessed that you will never forget
   f. A belief you hold strongly and are committed to
   g. A moment when you did something really well and are proud of your success
   h. A funny or embarrassing event that makes you laugh (at least now if not then)

2. Once you have your list, share with a partner. Each of you elaborate (one or two paragraphs) on one or two writing ideas that particularly appeal to you at this moment as potential writing topics. Listen to each brief description and provide feedback as to how the stories might be of interest to a reader.

3. Select a topic, genre, and audience for one of the pieces on which you elaborated and begin writing. Using the freewrite strategy, write for 15 minutes, being sure your writing is sufficiently well developed to be understandable when read to your partner, as you will share this writing.

4. After 15 minutes of writing, share your writing with your partner. As a reader, you are obligated to do two things. One, read what you have written. Do not paraphrase or skip anything. Two, read unapologetically. That is, do not do what so many authors do at this moment and begin with an apology. It is common to hear people begin reading their writing by announcing something like, “This is not so good” or “I couldn’t really say what I wanted to” or worse. Here, what is beginning to form is a writing community. Everyone is in the same position, having begun with a freewrite, and has the same responsibility to support her or his fellow writers. All writing at this point is freewriting. It is rough and sketchy at best. That is how it is supposed to be. The role of the listener is extremely important in writer’s workshop. The listener is to provide specific, useful, positive feedback to the author. Partners are active working partners, listening to story content, how it is being told,
and responding to the writer with informative comments regarding what works well in the piece of writing, what is of greatest interest to the reader, what a reader would want to learn more about, but also, what is distracting, unclear, or perhaps irrelevant. The respondent also speaks to genre and how well the message is conveyed. Commentary is always supportive and should serve as a positive force for writing growth.

5. With responses in hand, writers now return to writing. Take 20 minutes more to work on your writing piece. Since it is essential that writers always take full ownership of their writing, partner feedback is only advice and suggestion. Each author must decide what feedback to attend to and what to ignore. There is no imperative for writers to accept partner suggestions. For the next 20 minutes, you can extend your work, elaborate on what you have already written, or revise it in some way. Remember that the sharing process will continue within the writer’s workshop, and for some, this work will proceed to a finished product to be read to the entire class.

Working through this process, you have participated in the beginnings of writer’s workshop. It is only the beginning and in a writing class, likely, the only time everyone will be at the same place at the same time. From here, writers move in quite different directions along unique time lines. That is not to say the teacher sits back and watches as writing unfolds. Quite to the contrary, the teacher’s role remains critical. The essential areas of teacher control when orchestrating a workshop include the following:

1. Providing the three cornerstones of writing: time, ownership, and response
2. Creating context
3. Delivering mini-lessons
4. Establishing expectations and setting rules
5. Keeping track

**Three Cornerstones**

As with readers, writers begin with three basic needs: time, ownership, and response. *Time* on task is necessary for writers to believe they are becoming writers, to sense the true job at hand and the joy of writing. The time committed must be reliable, predictable, and dedicated. Writers must be able to anticipate when and for how long they will be able to write without interruption. Writing is absorbing mental work. Flitting in and out of the task won’t do. Furthermore, time is value. Failing to commit time communicates lack of value. What we do not have time for we do not value.

Writing is personal and involves risks. What we commit to paper or to electronic image is forever there. It represents us at a given point in time yet has a timeless presence. Unlike the spoken word, which can be retracted or rephrased, what we write is forever. Since the risks are taken exclusively by the author, ownership of the content must too belong to the author. Without ownership, the author is no longer the somebody speaking to someone but rather the servant to someone. The author’s link to the message becomes diluted, and writing is no longer an act of discovery. For
writers to sustain their energy and purpose, they must be responsible for the content and take full ownership of the method.

Literacy was borne from community and a commitment to caring (Degnin, 2009). Language represents accrued commonality and agreed realities between peoples. Its various forms of expression have consequence (response) as their intention. Writing in a vacuum renders writing meaningless. We could very well add to Moffett’s (1968) description of writing as somebody talking to someone about something in anticipation of real consequence. Fundamental to writer’s workshop is response. Responses come from the writer, from peers, from teachers, and from other accessible audiences.

Creating Context

Students are remarkably flexible. We ask them to write, and mostly, they do regardless of their surroundings. Yet we know that writing is a demanding task, requiring concentration, readily available resources, necessary equipment, and a relatively risk-free psychological environment. We also know that each writer is different, and each writer needs change from time to time. We recognize these writing realities, but rarely do we accommodate them. To truly facilitate student writing, attention must be paid to the writing climate. Today, students are quite facile writing on computers, though many still prefer paper and pencil. Computer access means access to resource support and boundless information but also access to immediate distractions. Many students cannot compose online without also multitasking, that is, twittering, posting to Facebook, or other distractions. So hard copy resources such as thesauruses and dictionaries and other supportive texts remain essential.

For many students, and more and more, we are learning that for boys in particular, an imposed organizational structure is critical to successful completion of assigned work. An organized workshop enables writers to keep track of their work and their teacher to successfully monitor and evaluate student writing. More important, it provides writers with clear structural support so they are not distracted by wondering how things get done and can attend to only what they must write. Whether you are a working to develop writers or assigning writing for learning, student writers need a supportive setting that enables them to write successfully.

Mini-Lessons

Mini-lessons are a big part of writer’s workshop, which we will address briefly here. There is much written about mini-lessons with myriad examples of how to conduct mini-lessons. Calkins (1986) suggests that when done properly mini-lessons can “encourage wide-awakeness” (p. 45). For our purposes, we will speak to the basics of why and how. We mentioned that writing is complex and rarely comes naturally. Learning the conventions of writing, language usage, composition, and genres requires ongoing instruction and practice with plenty of feedback along the way. Writing begins with prewriting and early writing activities that lack conventions and are intended to elicit ideas. And much student writing stays at this level. However, some student writing will progress to more finished levels, displaying proper writing conventions, exhibiting knowledge of a specific content, and residing within a specific genre. Moving from rough draft to final draft demands specific skills that need to be taught and practiced. These skills are best taught within the context of
authentic writing so students can apply newfound writing skills directly to their own compositions. As teachers observe student writing, more often topics for mini-lessons emerge from students' own writing and become a natural next step in their writing development.

A mini-lesson is so-called as it rarely lasts more than ten minutes, though some do take longer. They are highly focused and are intended to provide information about a single topic or area that students can then apply immediately to practice. They take several forms. Procedural mini-lessons explain how writer's workshop works. At the beginning of each year or in some cases the beginning of each term, a procedural mini-lesson is offered so students understand from the first class forward how writer's workshop is conducted. For discipline-specific courses, a procedural mini-lesson is just as essential and should include discussion of the role writing to learn plays in learning course content. It might also be a good time to point out that national assessment of content-area knowledge now includes writing samples as part of the testing procedure, so developing the capacity to express one's content knowledge in writing is an essential skill.

Another type of mini-lesson is related to writing conventions. These mini-lessons typically develop out of direct observation of student writing. You may observe students struggling with a particular verb usage or some other language usage issue. They may appear ready to try a new genre but need explicit information before proceeding. Capitalization and spelling issues may need to be addressed or the use of adverbs. Students may not be clear about how to revise a piece they want to move forward to final draft. Mini-lessons can also address content. Students may be expressing some confusion about historical events or need some additional information to understand why an event is important now, though at the time, it did not seem so significant; for instance, the battle in 451 between Attila the Hun and a coalition of Romans and Visigoths (Man, 2005). The Romans and Visigoths were normally enemies but united to stop Attila near what is now Orleans in the heart of France (Gaul). Attila was stopped on the plain there, though allowed to escape with his army partially intact. If not stopped there, Attila would have gone on to take all of Gaul and precipitate the collapse of Rome. All of Europe and the role of Christianity would have changed forever had that battle resolved otherwise.

What makes mini-lessons an essential part of writer’s workshop is that the content is usually derived from identifiable student needs when engaged in authentic writing activities. They are intended to take students from where they are and move them forward in their own writing while providing an atmosphere that values writers and the writing process and writing as a tool for learning. Like readers’ workshop mini-lessons, writer’s workshop mini-lessons afford teachers an opportunity to speak directly with their students about issues central to their daily work. Often, a mini-lesson is delivered to the entire class, but just as often, it is offered to a small group of students taken aside, while the rest of the class is writing, to work on specific needs of those particular writers. When done, in the latter forum, they take on the cast of a conference. Conferencing, as we know from readers’ workshop, involves individuals or small groups and usually addresses quite personal needs, issues or levels and/or rates of progress for those readers or writers.

**Establishing Expectations and Setting Rules**

Writer’s workshop works because it is well organized and operates according to specific rules and expectations, and because the rules are adhered to by teacher and
students alike. Beginning with the opening procedural mini-lessons, clarifying expectations and setting parameters create a sense of purpose and value for writing that builds respect for the writing process and for each other as writers. It is not enough to state expectations at the outset. Students need the rules restated and enforced in order to develop an appreciation for them. Workshop rules should be few and simple. Be quiet, people are writing; always be writing, revising, sharing your writing with a partner, researching, conferencing, self-monitoring your writing progress, or participating in mini-lessons; always have what you need for writing with you; always provide positive support for the writing of others. We believe in student-developed rules as well. As writing workshop progresses, a mini-lesson may focus on establishing additional rules students believe may further facilitate their own writing work.

Keeping Track

Writer's workshop is a process with many parts. Making it all work for both students and teachers requires a fair amount of record keeping by both students and teachers. In our discussion, we spoke of how essential ownership is to writers. This extends to taking responsibility for maintaining some record of writing activities. In most cases, record keeping is a shared responsibility, as teachers must also hold writers to account for their writing growth, their willingness to be adventurous, and their indulgence in the writing process. Students keep track of their topic search ideas, the pieces they have written, where they are in the development of various pieces of writing, the types of writing they have engaged in, the types of writing they would like to undertake, how long their various writings have been, what they have learned from mini-lessons and conferences, and how it appears in their writing. They may also be responsible for specific documents such as an editing worksheet developed as a reminder of the conventions most often forgotten or something specific to a particular writer. The teacher too maintains records on these same issues in documents shared with the student. In writer's workshop, assessment and monitoring are combined and are conducted as a partnership. To provide specific feedback, teachers also maintain records of conference conversations, goals for each student's writing, including targeted expectations for student development.

Content-Area Writing and Writer's Workshop

Earlier, we promised that content-area teachers would not have to become writing teachers. You don't. However, knowledge of process writing will make content-area writing-to-learn assignments more valuable. Whether writers write for writing class or history class, the process is the same. Writers need a supportive environment (community), opportunity to write, productive feedback throughout the process, clear rules and expectations, opportunities to think first in text and meet conventions later through revisions and editing, and chances to listen and share.

Take time now to discuss writer's workshop and what it suggests for how you will incorporate writing into your content instruction. Spend time
discussing with a partner or in small groups. If writing is not already part of your content instruction, think as well about how it might serve your content and your students. When this discussion nears an end, say, 15 or 20 minutes, in a small group, add one last dimension. Consider how process writing and the ERR framework might merge. There are some obvious links when we think of moving from a topic search through early writing and conferencing and/or sharing to final draft. There are other, perhaps more subtle, parallels and applications as we contemplate content-area writing to learn. While discussing various application possibilities, keep track of the ideas in your journal. Then on your own, or with a content-area partner, develop a lesson using your own content and applying a writing-for-thinking component embedded within the ERR framework.

**Role, Audience, Format, and Topic (RAFT)**

RAFT is a writing-to-learn strategy developed by Carol Santa (1988) and her colleagues through the Creating Independence through Student-owned Strategies (CRiSS) program. It is a cross-content writing strategy based on prompts for student writing.

RAFT is an acronym for the following:

R—Role (Who are you as a writer?)
A—Audience (To whom is the writer writing?)
F—Format (What form of writing will the author select?)
T—Topic (What will the writing be about?)

RAFT is perhaps best used in the reflection phase as a culminating experience. One important element of this strategy is that teachers can offer a somewhat limited selection of, say, topics but give students choices over the other elements of RAFT. This satisfies the teacher’s wish for students to use writing for thinking on a particularly important area of study yet respect the importance of ownership in the writing process through choice. Applying RAFT is relatively easy once students understand some fundamental elements of writing.

R. For example, one critical element related to role that students must understand is that all writing reflects perspective or point of view, and that no writing is without bias. This idea is of course evolutionary in that students awaken to the implications of this idea over time as they mature and realize the significance of perspective in chronicling historical events or writing newspaper reports or political discussions. Students will need familiarity with the different hats they can wear as writers.

A. Audience can be one of the most playful and intriguing elements of writing. Students can learn some critical lessons about writing as a medium for communication by writing on similar topics but to varying audiences. Or students might be assigned a topic and a single audience to address and then compare their writing to see how each approached that particular audience. Another possibility is to present a topic and ask if writing varies according to audience and format.
How might students present an issue if they were texting a friend, twittering or blogging, or writing a formal letter to their senator or the queen of England, their teacher or parents?

E. Conversations about audience, as we have seen, also precipitate deliberations about format. As students learn and become practiced with various writing formats, they are placing more writing tools in their communications toolbox. Students are often eager to learn various formats for writing and seek alternatives to basic narrative writing. Varying format offers opportunities for creative writing and avenues for expression that might not surface if students are limited to basic essay writing.

T. Selection of writing topic often presents the greatest struggle in content-area writing. Teachers usually have in mind some specific essential questions for students to address. When considering topics, it is useful to think in terms of the overarching questions students should address; then consider the conceptual ways in which that essential point can be approached. This can yield differing topic prompts. As is true with any discipline, there is always far more to explore than there is time for in an academic year. Consider the broad array of essential questions and which ones students might be able to extrapolate to from what is presented through the course and make topics available in these areas. Finally, there are always lots of ways to approach any topic. Giving writers the opportunity to think through specific writing prompts, they might like to pursue an effective way to engage them in writing about central issues for class.

As we have suggested, for RAFT to succeed, students require knowledge of perspectives, audience, and format. These are excellent topics for mini-lessons in writer’s workshop. Here, students can be asked to write pieces with particular perspectives that have been discussed and modeled—the same of course for format, role, and audience. Once students are experienced, then RAFT can be quite an effective content area writing strategy.

To implement RAFT, do the following:

1. Be sure students have the skills necessary to apply to the various possibilities RAFT offers.

2. Provide writing prompts and, when needed, sample leads for assorted role, audience, and format options.

3. Ask students to make RAFT choices according to how you would like the assignment to impact both individual writers’ needs as writers and the class as a whole. It may be useful at times to have a class diversify choices so, when sharing, students will be exposed to multiple perspectives or formats on a particular topic.

4. Provide students with time to write and the opportunity for feedback. Students should be encouraged over time to vary RAFT selections. Sometimes, students get stuck. It is fine to set expectations for some writing diversity.

Here is one example of RAFT writing choices related to one of our earlier example writing topics. You will recall the discussion regarding land use choices in
Maine and their environmental implications. One RAFT writing choice might look like the following:

R—Environmentalist
A—State of Maine Land Use Regulatory Commission
F—Letter
T—Control of land use along state waterways

Another might include the following:

R—Middle-income all-terrain-vehicle or snowmobile enthusiast
A—Newspaper readership
F—Letter to the editor
T—Accessing land for recreational use

One adaptation to RAFT we are familiar with adds a new dimension to the writing piece. Some are adding an “S” to make the acronym RAFT(S). The “S” refers to “Strong verb” and suggests prompting students to reflect on how strongly they feel about a particular topic, whether they are disturbed, angry, curious, confused, quizzical, dumbfounded, enraged, gratified, or relieved, for example. There are times when student sentiment about a topic may be important to the presentation. There are times when this might be less relevant. It is an interesting adaptation to consider. One suggestion to assist students with making choices is to have students keep a chart of their own writing history with various RAFT options that have been presented to them either in general discussion or mini-lessons or they have direct experience with as writers. They can keep this chart in their journal as can you.

**Self-Regulated Strategy Development (SRSD)**

We mentioned SRSD earlier as one of the process-writing strategies to receive research support for enhancing student writing. SRSD was developed over 20 years ago to support the writing efforts of struggling learners. As we know, writing is a complicated process. Writers need to work hard to develop a message. This requires knowledge of content, organization skills, goal-directed activity—both for self-management and as a feature of composition—understanding of audience and perspective, and then the application of formal writing mechanics. Even for skilled writers, these complex processes pose serious challenges. The research on SRSD has demonstrated efficacy of the strategy first for struggling learners and subsequently for all school-aged developing writers. The areas of evident growth for writers using SRSD are in quality of their writing, understanding of writing processes, and their overall approach to writing. Process writing improvements have been demonstrated in draft revision skills, evidence of content knowledge, writing conventions, and the capacity to plan and organize for writing.

Basically, SRSD focuses first on deliberate discussion and elaboration of self-regulatory behaviors essential for most writers to be successful. These include setting purpose and outcome goals; establishing steps or strategies or procedures as self-instructions to achieve goals; monitoring progress, including monitoring goal
oriented behaviors; and providing self-reinforcements for achievements. Along with these self-regulatory functions, six phases of prewriting and writing performance are proposed. They include the following:

1. Activating background knowledge and schema for both process and content
2. Determining which strategies to apply, including subsequent outcomes for strategies considered
3. Engaging in cognitive evocation of the application of the selected strategy to the piece of writing being composed
4. Committing the process or strategy to memory so its application is fully realized and then sticking with it
5. Determining in advance available support
6. Engaging independently in the writing process employing the selected strategy

This strategy can be elaborated at multiple levels. More advanced writers write with an awareness of the process, applying it as needed. Less advanced writers can be led with some deliberation through the process until its application becomes more automatic or routinized. What we appreciate about the strategy is that it engages students at both content and process levels. In so doing, it emphasizes the primacy of content while acknowledging the essential role of process knowledge in putting the writing tool to work effectively for learning and communication. This strategy also begins with evocation activities for both process and content, grounding the student before proceeding. It then guides students through a multitiered realization phase that relies on original evocations and is goal oriented, involving writers cognitively and metacognitively. Finally, it leads writers to finished pieces and concludes with orchestrated reader-response activities that facilitate self-reflection on the piece and the process.

CHAPTER REFLECTION

Writing can be a joyful process, a process of illumination and self-discovery. Students do not often feel this way about writing in school. There is much we can do to create an environment for writing that provides students the tools for writing while encouraging them to become lifelong writers. Writing, though, is not simply a subject to be taught. It is also a powerful tool for thinking and learning that can facilitate content-area learning. Certainly, content-area teachers do not wish to become writing teachers, yet the contribution to content-area learning constructive writing activities makes it difficult to ignore. The goal for content-area teachers is to determine how best to incorporate writing into content-area instruction to maximize student learning while remaining focused on essential content. Several strategies are offered here to support content-area writing. It will be useful at this time to gather in small groups to discuss how you will incorporate writing and elements of writer’s workshop in your content-area studies. Think about the three cornerstones of writing and the various strategies discussed, and propose ways writing can be introduced in support of content learning. Think as well about the ERR framework. Consider how writing can be incorporated in the various phases and how writing purpose might change as it is incorporated into each of the phases.
Reflection

What we achieve inwardly will change outer reality.
—Plutarch

EVOCATION

Before we engage in a discussion about two issues central to our thinking, truth and transformative learning, it makes sense for you to engage in some independent thinking to bring to an awareness level your own views. So we would like you to begin to think about “truth.” Truth is a powerful concept about which we all have some thoughts. The pursuit of truth has been, both explicitly and implicitly, a recurring theme throughout the text. When we speak about students engaging in the construction of meaning, truth takes on new dimensions with interesting implications for teachers and students. Discussions about curriculum and what the big ideas and issues are for our lessons take on new significance and lead us in interesting directions. Take five minutes and complete a freewrite on the topic of “truth.” Use the freewrite to express your own thoughts on the nature of truth, how you define truth, how you arrive at truth, how you know it when you see it, or how your understanding of truth might impact your teaching. When you are finished, share with a partner, looking for ways differing definitions of truth might have consequences for teaching. Keep these thoughts in mind as you read the rest of this chapter and consider how your present understanding of truth compares with ours.

LEARNING CENTERED

In drawing this professional development sequence to a close, we think it might be useful to offer a summary of the root ideas that have underscored our work together. This discussion represents an attempt on our part to end as we began, with full disclosure. The fundamentals of our beliefs have emerged throughout the text. In
Chapter 3, we discussed Dewey’s (1987) ideas of the reciprocal process of learning, and we will go into greater depth below. Throughout the text, we have also referred to the work of the cognitive and motivational psychologist Mihalyi Csikszentmihalyi (1997). His work on flow and how people become fully engaged learners also informs our thinking about instruction. We will speak primarily about two basic ideas: transformative educational experiences and truth. You will see that our conception of these two ideas, borrowed from many others, is that they are the result of interplay between what might appear to be opposites but are in reality two complementary elements of a relationship in positive tension. You may recall this idea of joining opposites to bring about a third, more unified idea was first addressed in the introduction. You have likely noticed that in our instructional model, we invite students and teachers to engage one another in a dialogue about ideas and content, and to wrestle with these ideas in a genuine give-and-take. We ask students to step forward and take responsibility for their learning, but we also propose a central role for the teacher. We encourage students to construct meaning from their experiences but also to listen to others and be open to the thoughts and insights of both peers and their teachers. Finally, we encourage teachers to provide instruction that leads to genuine lasting student learning. This requires learning experiences that truly result in permanent change in students. This Professional Development Sequence (PDS) has asked you to become different as an outcome of your involvement. You have been encouraged to become a different teacher from the one you were when you started. Change is hard, so we have not asked this of you without some grounding in theories about learning that make sense to us. We want to review briefly some of that grounding. We also want you to engage in some final thoughts about your involvement in this professional development experience and to consider where you would like to go from here.

We will first speak to the grounding ideas for our belief system regarding thinking and learning and then engage you in some additional reflections. We confess; the discussion of some of our foundational beliefs gets a bit philosophical. It is important to understand how our ideas have coalesced, but sometimes the language gets complicated. Please bear with us, as we hope the discussion to follow opens a window to our thinking that will resonate with you or give ground for a healthy discourse about what it means to learn and what truth looks like. Then, please engage in the final reflections. They constitute an essential reflection on the process you have undergone.

TRANSFORMATIVE EXPERIENCES

As you have worked through this experience, you may have noticed that we are not entirely constructivists. Though there is much that is constructivist in our method, we do not support entirely the student-centered approach. We believe more strongly in the significance of the teacher and of the educative value of both a self-driven, student-controlled approach and an open, reflective, receptive model. David Wong (2007), in his discussion of Dewey’s concept of the aesthetic in education, explained the importance of both engaging and engaged students taking responsibility for their learning and, at the same time, bringing to students ideas, interpretations, and experiences apart from their own initiative that invite them to be open and receptive in order to advance their own self-directed learning. For an
experience to be educative, he suggests, it must be transformative. That is, it must result in real change. There must be outcomes of the educative experience, and these must be manifest in "new thoughts, feelings, and actions, and also as the world reveals itself and acts on us in new ways" (p. 6). But how do we engage in and orchestrate transformative experiences? For Dewey (1987), transformative experience occurs when we are engaged in a process whereby there is action followed by reflection on the consequences of those actions. In other words, learners have an experience and see that there are consequences to that experience and take time then to be open (receptive) to those consequences and to consider them in meaningful terms that result in real change to the learner. All the better is when these experiences and their consequent reflections occur in cyclical fashion, building on one another toward sophisticated understandings of the consequences of complex experience. He refers to this as a process of active doing and receptive undergoing. Wong (2007) elaborates,

The degree that any activity is aesthetic and educative . . . is related to the degree that an active doing and receptive undergoing are joined in perception. We do something, we undergo its consequences, we do something in response, we undergo again. And so on. The experience becomes educative as we grasp the relationship between doing [action] and undergoing [reception]. (p. 6)

How this differs from the purely constructivist ideal is perhaps less clear. Again, Wong (2007) clarifies,

The ideal relationship between person and world is often embodied in the constructivist vision of student-directed learning. In this view, students control their interactions with the environment and give meaning to what emerges. They are intentional and reflective throughout the whole experience. On the other hand, we are also aware that aesthetic experiences are not "willed" into existence. In fact an excess of conscious control and self-awareness is more likely to obstruct rather than facilitate the having of transformative experiences. (p. 6)

The idea of undergoing requires some broader understanding. It stands in contrast to active doing, so it is receptive in nature. For Dewey receptive undergoing is what enables us to absorb meaningfully our experiences. He writes, "There is . . . an element of undergoing, of suffering in its larger sense, in every experience. Otherwise, there would be no taking in of what preceded" (Wong, 2007, p. 6). For Dewey, learning comes in the evolving interaction between active doing and receptive undergoing, which he refers to as a kind of suffering. This suffering, though, is one that comes with change or transformation. Change can be painful for certain, but at times, it can also be exquisite pain. This suffering refers to the sort of suffering we all experience as we lose part of who we are in order to become someone other as learning and growth occur. If we are to have transformative experiences, then we are necessarily becoming something other than who we were before those experiences. There is a certain mourning for the loss, as in a loss of innocence, but it is temporary and should be a change that in its outcome brings about potential for flourishing.
As we elaborated this professional development experience and the instructional practices it proposes, we considered how to orchestrate experiences that created cycles of active doing and receptive undergoing. In conceptualizing this PDS as a means of engaging in this transformative process, we took Dewey’s idea to heart that the “...perception of relationship between what is done and what is undergone constitutes the work of intelligence” (Wong, 2007, p. 7).

TRUTH

Complementary to Dewey’s transformative paradigm is a notion of truth described by Degnin (2009) to which we subscribe and from which we derive some inspiration for the interactive, learning-centered, educative experience we describe in this text. Without becoming overly obscure, we simply view the seeking of truths as an encompassing goal for our students. For this to make sense, we have to spend a few minutes considering just what truth means and how we come by it. Take a few moments now to review your own thoughts from your earlier freewrite on what truth means for you and how you define truth. Now, read on with these thoughts in mind.

We consider the idea of truth to be a compelling one for educators because, in the words of Francis Dominic Degnin (2009), “...the measure of truth of a belief is its success in integrating the whole of experiences in ways which support human flourishing” (p. 6). Certainly, the end point for education is human flourishing. This seems so at the individual as well as the community level. It is why we care about education at all. So how does truth lead to human flourishing? Degnin, in his articles “Truth, Faith and Intelligent Designs: A Pedagogical Essay” and “Talking With Students About Truth: Using Heidegger to Loosen the Grip on Absolutes” provides a guide. Basically, Degnin suggests there is an interactive relationship between an object and our perception of it. He asks how it is we know, for example, that a flag is red. Does the truth of this lie in the flag or in our perception of the flag? He offers that, in essence, “...the only way to measure the truth of our perception is by knowing the truth of its object, while the only way to know the truth of our objects is if we know the accuracy of our perceptions” (p. 6). Or more briefly put, truth is found in “the relationship between an idea and its object” (p. 6). “This suggests that truth functions not as an absolutely correct correspondence between our ideas and reality but as a creative means for organizing our experiences in ways which serve our basic needs” (p. 7).

If our aim as educators is to bring students to some form of truth that is transformative and has as its outcome the possibility to flourish, then our task is to guide students through two important relationships. The one relationship is between active doing and receptive undergoing, that is, relations between students’ willful exploration and their openness to the consequences derived from that exploration in a reciprocal and ongoing process. The other is the relationship between object and perception, or for our purposes, between content and concept, in an interactive and reciprocal hermeneutic circle that, again, likely describes “...how we actually live our lives” (p. 6). So when we create opportunities for reciprocal engagement and reflection in a context of openness (receptively), where teacher and students each play vital roles in negotiating the correspondence
between ideas and reality, we set the stage for transformative educative experiences. The ERR framework in its variations offers teachers and students a means whereby they can negotiate these two relations simultaneously. We see the reciprocal and ongoing unfolding of the ERR framework as an instructional framework, which enables teachers to lead students in a quest for truths that, when revealed, enable students to find the experience transformative.

FINAL REFLECTION

We have nearly come to a stopping point. You have worked hard to get here. We hope this path has led to much sharing with your peers and a great deal of discussion about teaching and learning and how best to accomplish both. It will not come as any surprise to you that before this process comes to a close, we would like you to engage in some reflection. Of course, we want you to reflect on multiple levels. This time, we ask that you reflect on the usual two levels of content and process. We also encourage you to look back at the opening quote to this chapter by Plutarch. Plutarch speaks to the change within as the starting point for all other change. We believe ultimately that lasting change occurs only when individuals believe and live with new realities, with clear knowledge of new possibilities, and with the intention to realize those possibilities. So begin your reflection by asking yourself if you have experienced change personally through your work with this PDS. If so, how do you know, what does change look like? Has your experience led you to see any new possibilities for your own practice? What are your intentions with respect to these possibilities? How will you realize them? After you have thought about this, do some writing and then share your thoughts with a partner.

Once that discussion has wound down, turn to some reflections on specific content. What has struck you as particularly significant, useful, or intriguing? What do you think might have the greatest impact on your teaching? Are there some strategies you think might be particularly helpful in your teaching? Again, jot down your thoughts and then share with a partner or in a small group. If you have access to a small group, this would be the ideal group to share your thoughts with here.

As you are now accustomed to doing, next, reflect on the process. How well did this professional development experience play out for you? Were you engaged in the activities? Did participation bring you to a fuller understanding of the content and how you might implement the instructional pieces in your own classroom? Think back to your experiences as you proceeded through the PDS and then share your preliminary thoughts with a partner and with a small group.

Finally, using your journal as a resource, take 15 to 20 minutes to write out your reflections from these prompts in a more complete
reflection of your experiences with the PDS and its impact. When finished, first share with a partner and then in a small group. As you share, begin to develop a list of strategies attempted in classrooms of what worked and what was less successful. Return to your ERR chart. Make sure you have it up to date, and then, use it as a guide for discussing implementation.

WHAT TO DO NOW?

Consistent with the ERR framework, we see this professional development experience as embodying the framework. That is, it is structured to provide an ERR experience within an umbrella ERR sequence. But professional development is always ongoing; consequently, completion of this PDS should serve as an evocation for what is to come next in your own professional development. Discuss with your group or think on your own about what should come next for you, for your group.

We would also like you to be aware that in completing this process, you have joined a large, actually huge, family of teachers from around the world with whom we have had the privilege to work. Beginning in the United States, then extending to educators in an enormous number of countries around the world, educators have learned to teach using the ERR framework. They have gone on to develop an extensive list of strategies to complement implementation. Several journals have been spawned in a number of languages enabling teachers to share their work with other teachers, implementing the framework in their classrooms. What has consistently occurred is that teachers who have gone through this experience together have remained in contact to continue their dialogue on teaching and learning and to support one another as implementation proceeds. Many set a series of monthly meetings to be sure to stay in contact, and many set a particular agenda so there are expectations for participants going forward in terms of implementation and sharing successes and struggles. Each group is different. Your group should discuss what makes sense for you and make plans for your continued work. We wish you great success and many transformative experiences that will lead to your flourishing along with your students.
Appendix A

SEA TURTLES AROUND THE WORLD

Sea turtles roam the temperate seas throughout the world. These oddly graceful creatures inhabit the coastal waters of North and South America, the Mediterranean Sea, Africa and India, and the shores of the South China Sea. Many adults live in shallow estuaries and bays or in coastal waters along vast tracks of shoreline. Some even venture up rivers where they are snagged by fishing lines. Of course, they are caught only briefly before snapping the line of some excited fisherman and meandering on their way.

There are six different kinds of sea turtles: Green, Black, Loggerhead, Ridley, Hawksbill, and Flatback. Green sea turtles typically roam from nesting to feeding grounds along the coast. However, some wander across the Atlantic Ocean from the Ascension Islands to Brazil, a journey of over 2,094 kilometers (1,300 miles). Leatherbacks are the champions of long-distance migration with some Leatherbacks found as much as 5000 kilometers (3,000 miles) from their nesting beach. One variety of Ridley called an Olive Ridley may be seen traveling in large groups throughout the eastern Pacific and Indian Oceans.

Unlike land turtles, sea turtles cannot retract their limbs, called flippers, or their head into their protective shell. Rather they depend on their size and their hard shell for protection. How big do they get? The Leatherback is the heavy-weight of all sea turtles. An adult can reach 1.9 meters (six feet) in length and weigh up to 500 kilos (1,200 pounds). The record weight for a Leatherback is over 900 kilos or about 2,000 pounds. The smallest is Kemp’s Ridley at only 55 to 65 centimeters (22–30 inches) and 30 to 50 kilos (63–100 pounds).

Young turtles are hatched from eggs that have been laid in sand pits on beaches, usually where the mother turtle was born. Female Leatherbacks can lay up to nine clutches of eggs in a season; other sea turtle varieties lay two to three clutches in a season. Typically, the female lumbers ashore at night and lays her eggs in shallow pits she digs with her hind flippers. Once the pit is prepared, the mother will lay from 50 to 200 leathery, mucous covered eggs—each about the size of a ping-pong or golf ball. When the egg-laying process begins, females are unperturbed by their surroundings. They go about the business of laying their eggs as tears stream from their eyes. Some say this is to prevent sand from getting in their eyes. Once the eggs are laid, the females crawl back to the sea and leave their little ones to fend for themselves. The male turtle, though offshore during the egg-laying process, never returns to land.

Being a sea turtle hatchling is risky business. Most (90%) do not survive their first hour. As they emerge from the nest, these tiny creatures face almost certain death from fishes, seabirds, raccoons, dogs, and other predators.
Sea turtles are generally solitary creatures. From the time they first enter the water, sea turtles are inclined to spend most of their time alone floating on the surface, taking in the sun’s energy. Flatbacks can be seen floating motionless on the ocean surface with a bird perched on their backs. This behavior changes somewhat during nesting season. At this time, usually the warmest time of the year, Olive RIdleys can be found gathering in large numbers in front of their nesting beaches.

Sea turtles’ diets vary by species. Loggerheads and Ridleys dine on assorted vegetation, including seaweed and grasses as well as crabs, mollusks, jellyfish, and shrimps. Hawksbills feed in and around coral reefs and prefer sponges, squid, and shrimp. Adult Green and Black sea turtles are the only herbivorous sea turtles, but they are not dedicated vegans, as they will survive as carnivores in captivity without much convincing.

Giant sharks and killer whales are a threat to sea turtles. However, the biggest threat to sea turtles is humans. Besides eating turtles and turtle eggs, long-line fishing practices are deadly for sea turtles. It is estimated long-line fishing kills 4.4 million sea turtles, bullfish, sharks, marine mammals, and sea birds annually. Shoreline development encroaches on sea turtle nesting grounds, limiting population development. Leatherback populations have declined by 95% since 1980 and could disappear in just a few years.
Liam O'Flaherty, born in 1897, certainly may be ranked as one of the outstanding Irish literacy figures of modern times. Some of his works, such as The Assassin (1928), Famine (1937), and Land (1946), have been translated into several languages. Collections of his stories best known in the United States are The Mountain Tavern and Other Stories (1929), Spring Sowing (1924), and Two Lovely Beasts (1948). His numerous works include also verse, plays, biographies, a travel sketch based on a trip to Russia, novels, a tourist's guide to Ireland, and two autobiographical accounts, Two Years (1930) and Shame the Devil (1934). One of his most famous stories is "The Informer" (1925), which in 1935 was made into a movie that has since become a classic. In 1949, a one-act play version of the story was prepared, and it has been performed with considerable success. The civil war in Ireland that flared during the second decade of this century made a deep impression on O'Flaherty. Many of his best-known writings reflect his experiences during that period of terror and bitterness.

**THE SNIPER**

The long June twilight faded into night. Dublin lay enveloped in darkness but for the dim light of the moon that shone through fleecy clouds, casting a pale light as of approaching dawn over the street and the dark water of the Liffey. Around the beleaguered Four Courts, the heavy guns roared. Here and there through the city, machine guns and rifles broke the silence of the night, spasmodically, like dogs barking on lone farms. Republicans and Free Staters were waging civil war.

**FIRST STOP**

On a rooftop near O'Connell Bridge, a Republican sniper lay watching. Beside him lay his rifle, and over his shoulders were slung a pair of field glasses. His face was the face of a student, thin and ascetic, but his eyes had the cold gleam of the fanatic. They were deep and thoughtful, the eyes of a man who is used to looking at death.

He was eating a sandwich hungrily. He had eaten nothing since morning. He had been too excited to eat. He finished the sandwich, and, taking a flask of whiskey from his pocket, he took a short draught. Then he returned the flask of whiskey from his pocket. He paused for a moment, considering whether he should risk a smoke. It was dangerous. The flash might be seen in the darkness, and there were enemies watching. He decided to take the risk.

Placing a cigarette between his lips, he struck a match, inhaled the smoke hurriedly, and put out the light. Almost immediately, a bullet flattened itself against the
parapet of the roof. The sniper took another whiff and put out the cigarette. Then, he swore softly and crawled to the left.

He rolled over the roof to a chimney stack in the rear and slowly drew himself up behind it until his eyes were level with the top of the parapet. There was nothing to be seen—just the dim outline of the opposite housetop against the blue sky. His enemy was under cover.

Just then, an armored car came across the bridge and advanced slowly up the street. It stopped on the opposite side of the street, fifty yards ahead. The sniper could hear the dull panting of the motor. His heart beat faster. It was an enemy car. He wanted to fire, but he knew it was useless. His bullets would never pierce the steel that covered the gray monster.

Then around the corner of a side street came an old woman, her head covered by a tattered shawl. She began to talk to the man in the turret of the car. She was pointing to the roof where the sniper lay. An informer.

The turret opened. A man’s head and shoulders appeared, looking toward the sniper. The sniper raised his rifle and fired. The head fell heavily on the turret wall. The woman darted toward the side street. The sniper fired again. The woman whirled around and fell with a shriek into the gutter.

Suddenly, from the opposite roof, a shot rang out, and the sniper dropped his rifle with a curse. The rifle clattered to the roof. The sniper thought the noise would wake the dead. He stopped to pick the rifle up. He couldn’t lift it. His forearm was dead. “I’m hit,” he muttered.

Dropping flat onto the roof, he crawled back to the parapet. With his left hand, he felt the injured right forearm. The blood was oozing through the sleeve of his coat. There was no pain—just a deadened sensation, as if the arm had been cut off.

Quickly, he drew his knife from his pocket, opened it on the breastwork of the parapet, and ripped open the sleeve. There was a small hole where the bullet had entered. On the other side, there was no hole. The bullet had lodged in the bone. It must have fractured it. He bent the arm below the wound. The arm bent back easily. He ground his teeth to overcome the pain.

Then, taking out his field dressing, he ripped open the packet with his knife. He broke the neck of the iodine bottle and let the bitter fluid drip into the wound. A paroxysm of pain swept through him. He placed the cotton wadding over the wound and wrapped the dressing over it. He tied the ends with his teeth.

Then, he lay still against the parapet and closing his eyes, he made an effort of will to overcome the pain.

In the street beneath, all was still; the armored car had retired speedily over the bridge with the machine gunner’s head hanging lifeless over the turret. The woman’s corpse lay still in the gutter.

SECOND STOP

The sniper lay still for long time, nursing his wounded arm and planning escape. Morning must not find him wounded on the roof. The enemy on the opposite roof covered his escape. He must kill that enemy, and he could not use his rifle. He had only a revolver to do it. Then he thought of a plan.

Taking off his cap, he placed it over the muzzle of his rifle. Then he pushed the rifle slowly upward over the parapet, until the cap was visible from the opposite side of the street. Almost immediately, there was a report, and a bullet pierced the center of the cap. The sniper slanted the rifle forward. The cap slipped down into the street.
Then, catching the rifle in the middle, the sniper dropped his left hand over the roof and let it hang, lifelessly. After a few moments, he let the rifle drop to the street. Then he sank to the roof, dragging his hand with him.

Crawling quickly to the left, he peered up at the corner of the roof. His ruse had succeeded. The other sniper, seeing the cap and rifle fall, thought that he had killed his man. He was now standing before a row of chimney pots, looking across, with his head clearly silhouetted against the western sky.

The Republican sniper smiled and lifted his revolver above the edge of the parapet. The distance was about fifty yards—a hard shot in the dim light, and his right arm was paining like a thousand devils. He took a steady aim. His hand trembled with eagerness. Pressing his lips together, he took a deep breath through his nostrils and fired. He was almost deafened with the report and his arm shook with the recoil.

Then, when the smoke cleared, he peered across and uttered a cry of joy. His enemy had been hit. He was reeling over the parapet in his death agony. He struggled to keep his feet, but he was slowly falling forward, as if in a dream. The rifle fell from his grasp, hit the parapet, fell over, bounded off the pole of a barber’s shop beneath and then clattered on the pavement.

Then, the dying man on the roof crumpled up and fell forward. The body turned over and over in space and hit the ground with a dull thud. Then, it lay still.

The sniper looked at his enemy falling, and he shuddered. The lust of battle died in him. He became bitten by remorse. The sweat stood out in beads on his forehead. Weakened by his wound and the long summer day of fasting and watching on the roof, he revolted from the sight of the shattered mass of his dead enemy. His teeth chattered; he began to gibber to himself, cursing the war, cursing himself, cursing everybody.

He looked at the smoking revolver in his hand, and with an oath, he hurled it to the roof at his feet. The revolver went off with the concussion and the bullet whizzed past the sniper’s head. He was frightened back to his senses by the shock. His nerves steadied. The cloud of fear scattered from his mind, and he laughed.

THIRD STOP

Taking the whiskey flask from his pocket, he emptied it at a draught. He felt reckless under the influence of the spirit. He decided to leave the roof now and look for his company commander to report. Everywhere around was quiet. There was not much danger in going through the streets. He picked up his revolver and put it in his pocket. Then he crawled down through the skylight to the house underneath.

When the sniper reached the laneway on the street level, he felt a sudden curiosity as to the identity of the enemy sniper whom he had killed. He decided that he was a good shot, whoever he was. He wondered did he know him. Perhaps he had been in his own company before the split of the army. He decided to risk going over to have a look at him. He peered around the corner into O’Connell Street. In the upper part of the street there was heavy firing, but around here all was quiet.

The sniper darted across the street. A machine gun tore up the ground around him with a hail of bullets, but he escaped. He threw himself face downward beside the corpse. The machine gun stopped.

Then the sniper turned over the dead body and looked into his brother’s face.

Source: “The Sniper” by Liam O’Flaherty from Spring Sowing (© Liam O’Flaherty [1924]) is reproduced by permission of PFD (www.pfd.co.uk) on behalf of the estate of Liam O’Flaherty.
Appendix C

HALLOWEEN THOUGHT: BATS ARE BEAUTIFUL AND DO GOOD DEEDS

Ken Wells

Section 1

Bats are creepy. Bats are ugly. Bats get tangled in your hair. Bats spread lots of diseases. Turn your back and bats will suck your blood.

"People think those things," says Merlin D. Tuttle. "But bats are probably the most misunderstood creatures on the face of the earth."

Mr. Tuttle, among a few dozen of the world's scientists who seriously study bat biology, should know. He has traveled the globe investigating bats. He has braced nights in jungles, scaled mountains, climbed trees, and wandered deep into caves just to get to know bats better.

Bats, Mr. Tuttle concludes, not only have enormous scientific value—current bat research holds promise for improving birth control, fighting cancer, and treating speech defects—but also are often highly intelligent and easily trained. Some large, fruit-eating bats, raised as pets, have shown the affection and loyalty usually associated with the family dog.

Experts in Sonar

The 41-year-old Mr. Tuttle, who earned a doctoral degree studying the winged mammals, adds, "Bats have mastered the night sky like dolphins have mastered the sea." The bat's sonar navigation system, known as echolocation, is so advanced, in fact, that it goes beyond current scientific understanding.

But new, intriguing knowledge that casts more favorable light on the shy, nocturnal creature hasn't seemed to help the bat's rather gloomy public reputation. "Because of fear and ignorance, millions of bats all over the world are being needlessly destroyed," Mr. Tuttle says. "A few species already are extinct, and several more are on the endangered list," he adds.

But Mr. Tuttle and other friends of the bat are striking back. They formed Bat Conservation International, a group that intends to boost bats globally. The organization recently helped set aside a preserve for Britain's endangered horseshoe bats; it began ambitious efforts to preserve bat-cave habitats in the United States, and it is lobbying for increased private and public spending on bat research.
Section 2

But a large part of Bat Conservation International’s mission will be to handle the bat’s public relations.

“An important part of our job is to rehabilitate the image of the bat,” says Stephen Kern, the organization’s sole employee.

Currently, Bat Conservation International, based at the Milwaukee Public Museum where Mr. Tuttle is the curator of mammals, is rich in aspirations if not in money or members. But the group already has struck on the pro-bat propaganda front, publishing a pamphlet that obviously reflects Mr. Tuttle’s attitude toward bats.

The following are among the pamphlet’s bat stats:

- Bats, for their size, are the world’s longest-lived mammals, with some species surviving 30 years or more. (“If humans could duplicate bat physiology, we’d all live to be as old as Methuselah,” Mr. Tuttle says.)
- About 1,000 bat species exist. They account for about one-fourth of the world’s mammal species. An estimated 70 million bats living in a series of caves near San Antonio, Texas, are probably the largest concentration of vertebrates on the planet.
- The world’s smallest mammal happens to be a variety of bat the size of a bumblebee. It lives in Thailand.
- One species of bat almost single-handedly pollinates a $90 million fruit crop in Asia. Bats may be the most important seed-dispersing animals in some tropical rain forests.
- Bats eat bugs by billions. A single gray bat, an American species considered endangered, eats about 3,000 insects a night. A 20-million-member colony of Mexican free-tail bats in Texas eats about 250,000 pounds of bugs in a single feeding cycle.
- Bat guano mined from caves is a major source of fertilizer in numerous developing countries. It helps grow about one-third of the world’s black pepper.
- Bats are considered quite edible in Asia and Africa and throughout the Pacific. A good bat dinner in a nice restaurant on the island of Guam will cost you $25.

Section 3

Mr. Tuttle doesn’t eat bats, but he thinks the fact that others do shows that bats have a usefulness not usually ascribed to them, particularly in Western culture, where bat phobia is most rampant. “Bats in America, Europe and Latin America,” he adds, “suffer persecution more than bats in other parts of the world, principally for two reasons: the Dracula-vampire syndrome and overblown fears that they spread disease, particularly rabies.”

“Dracula,” says Bat Conservation’s Mr. Kern, “is all literary and movie hype. The 14th-century Romanian nobleman upon whom the legend is based seems to deserve a bad reputation, considering his penchant for impaling unruly peasants on long wooden stakes. But the bat seems to have just got dragged haplessly into the tale, since there were and are no bloody-sucking bats in all of Europe,” Mr. Kern says.

Still, the legend was so persistent that Spanish conquistadors got to the New World expecting to find a blood-sucking bat. When they did, they named it the “vampire,” after its fictitious Transylvanian cousin.
The Blood Suckers

Of the three species of blood-sucking bats found in Central and South America, only one is prevalent enough to be considered a dangerous pest. But "it's just a little fellow—about three to four inches long" and clearly prefers cattle to people.

"To judge all bats by the vampire is the same way people used to shoot every hawk they saw because one hawk stole the chicken. Most people treat hawks better than that now, but today all bats suffer because of the vampire's bad reputation," Mr. Tuttle says.

Rabies is a more serious problem, Mr. Tuttle concedes, but even the rabies threat in bats is slight compared with other wild animals such as skunks, raccoons, and foxes in particular—and even compared with household dogs and cats. Of 28 confirmed rabies cases in the United States since 1963, only five have been traced to bats (dogs were the main culprit). And even some of these bat cases are "suspect as to origin," says Denny Constantine, a veterinarian for California's public health service. "In Asia, where rabies control is poorer, only a single case of human rabies has been linked to a bat bite since records have been kept. But 15,000 cases have been linked to dogs," Mr. Tuttle says.

Moreover, Mr. Constantine says, "Bats don't go through the aggressive stage of rabies," meaning they don't usually attack people or other animals unless harassed or touched. So to avoid problem, Mr. Constantine suggests staying away from sick or injured bats or those acting peculiarly.

Section 4

The Ugliness Issue

But on a clear, warm California morning, Philip Leitner has his hands all over bats. Mr. Leitner, a professor of biology at St. Mary's college near San Francisco, is an avid bat hobbyist. He has driven out to a barn in California's wine country to collect a few so-called pallid bats for an upcoming science exhibition.

These tiny, page-brown bats, like most bats, are insect eaters by night and sleepers by day. After climbing into the darkened loft where the bats roost, Mr. Leitner deftly shakes a few into a net and brings them down into the light of day, where an essential question of the bat debate is being discussed: Are bats really ugly?

Whimsical as the question is, Mr. Leitner doesn't mind offering an opinion. An elemental requirement of a bat fancier, he says, is to be someone who "doesn't take himself too serious." Mr. Leitner, whose fascination with bats goes back to his childhood, thinks these bats "are kind of cute."

Actually, they are. On close inspection, pallid bats have endearingly large ears and a kind of friendly, canine face. "The pallid bat," Mr. Leitner says, "is an ordinary-looking bat." He once saw a rare spotted bat that even the most grudging bat-baiter might agree is "spectacular," he says.

Beauty and the Bat

Ask Mr. Tuttle about bat beauty and you get an earful. A crested bat has colors rivaling a peacock's, an African singing bat sports colors so striking that he calls it a "gorgeous little beast."
“Most people,” Mr. Tuttle says, “don’t get to see bats in all their beauty. In zoos, bats are usually displayed under unflattering infrared lights to simulate their cave environment, although many bats can tolerate a little daylight,” according to Mr. Tuttle. “So one campaign of Bat Conservation International will be to persuade zookeepers to get bats out of the spooky glare of infrared and into the more flattering light of day,” Mr. Tuttle says.

“Bat beauty,” Mr. Tuttle says, “is more than skin deep.” Though he has studied bats since he was a teenager, he says he continued until recently to underestimate the bat’s intelligence. But a certain Panamanian frog-eating bat helped change his mind.

The bat, Mr. Tuttle recalls, was a captive that quickly adapted itself to researchers by learning to take frogs from their hands. That done, Mr. Tuttle then hoped to coax the bat to begin swooping on frogs placed in a mock pond, where its tactics could be studied more closely. But the bat, by then, “already was too clever for that,” preferring instead to “beg frogs from the researchers,” Mr. Tuttle says.

So Mr. Tuttle released the bat and marched a couple of miles through the jungle contemplating how to capture another.

And who should follow? “Our bat flying out of the jungle, trying to land on our hands,” Mr. Tuttle says.


(Please note: This article has been subdivided for demonstration purposes. It is not necessary to reproduce the text when applying the various methods to text in your textbooks. Simply orally identify breakpoints so students will be clear what parts they are to read.)
Appendix D

THE HEART BEAT

Robert I. Macey

Section 1, Part A

1. Like any muscle, the heart can be stimulated, and it will conduct action potentials. In many ways, it behaves like a skeletal muscle, but there are some exceptions. Skeletal muscles contract only if they receive some external stimulus. Ordinarily, the stimulus is a nerve impulse leading to the muscle. This is not true of the heart muscle, which seems to be capable of exciting itself. Even if we cut all the nerves leading to the heart, it will continue to beat. This capacity for self-excitation is common to all heart tissue.

2. If we remove the heart of a cold-blooded animal (a frog, say) place it in a dish, and cover it with Ringer's solution, the heart continues to beat—even when it is completely disconnected from the body. If we now cut the heart into pieces, even the pieces continue to beat. However, some pieces beat faster than others. Those from the upper parts of the heart (the atrium) beat faster than those from further down (the ventricle).

Section 1, Part B

3. We do not know what causes this built-in rhythm of the heart. In a normal heart, the various parts do not beat at different times and with independent rhythms. This is because there is an excellent conduction system in the heart. The first piece of tissue that becomes excited generates an action potential. The action potential is then quickly transmitted to all parts of the heart, exciting the entire tissue. As a result, the entire heart beat is coordinated, pumping with maximum force, and sending the blood surging into arteries.

4. Figure D.1 shows the heart in more detail. In addition to being divided into a right and left side, each side is subdivided into two chambers—the atrium and the ventricle. At the rest, the atrium serves as a storage depot for blood returning from veins toward the heart. When the heart begins its beat, the atrium contracts first. Although it may help fill the ventricles with blood, it plays a very minor role in the pumping of blood. A moment later, the ventricles contribute most of the pumping action in the heart. The right ventricle is responsible for pumping blood through the lungs; the left ventricle is responsible for pumping blood through the rest of the body.
Section 2, Part A

One-Way Flow

5. When the heart muscles contract, why isn’t blood squirted backward into the veins as well as forward into the arteries? And when the heart relaxes, why doesn’t blood flow into it from the veins and arteries?

6. Imagine that the heart is transparent and that we can watch the action of blood flowing in and out of it (Figure D.1). First, we see the heart at rest and notice valve flaps between the atrium and ventricle (A-V valves) on each side of the heart. Blood is pushing down on them from above. Below the flap there is very little pressure because the heart is relaxed. This means that the pressure of the blood from above pushes the flaps open and fills the ventricle.

Section 2, Part B

7. Now, the muscles in the walls of the heart start pumping. They begin contracting and squeezing the blood in the ventricles. This is the last time when we might expect blood to flow back into the veins through which it entered, but as we watch, we notice something happening to the valve flaps. The pressure below the flaps is now much greater than the above. This forces the flaps of the valve toward one another until they close up tight. Blood cannot push its way back into the atria. Instead, it is forced into the arteries. The opening into the arteries is guarded by two other sets of valves, located between the ventricles and their arteries. When the heart was at rest, these valves were closed tight. The pressure in the arteries was greater than the pressure in the ventricles; this kept the valves shut and prevented blood backing up from the arteries into the ventricles. (Notice that the flaps of these valves do not hang down into the ventricle like A-V valves. Instead, they point upward into the arteries.) When the heart makes its pumping stroke, the high pressure of the blood in the ventricle pushes on the flaps of the valves, guarding the arteries and forces them open. Blood now flows through the open valves because the pressure of blood in the ventricle is now greater than the pressure in the artery. Each time the valves open and close, they produce a sound. If you listen closely to your heart beat, you hear two distinct sounds: “lub-dup.” The first sound corresponds to closure of the A-V valves, the second to snapping shut of the valves between the ventricles and arteries. When these valves are damaged, the sounds change. For example, damaged valves between the left ventricle and aorta convert the sound to “lub-shh.”

Section 3, Part A

Cardiac Output

8. The amount of blood pumped by the heart is staggering. When you are at complete rest, your heart pumps enough blood to fill four automobile gasoline tanks each hour. Let’s break this down into more precise figures. During rest, the heart beats about 70 times per minute. During each beat, each side of the heart pumps roughly 70 ml of blood. The amount of blood pumped during each minute would then equal 70 ml per beat × 70 beats per minute, or 4,900 ml per minute (almost five liters, or 5.25 quarts, per minute).
Figure D.1  Blood flows into the heart from the veins when the heart is at rest. When the heart contracts, blood is forced into the arteries. Valves in the heart prevent blood from flowing in the reverse direction.

9. The amount of blood pumped by each side of the heart during each minute is called the cardiac output. During activity, the cardiac output changes. When you exercise strenuously, your cardiac output may rise to as much as 25 liters per minute. When a trained athlete exercises, his output may go as high as 40 liters per minute.

Section 3, Part B

10. The cardiac output is controlled in part by nerves of the autonomic nervous system. Impulses carried by sympathetic nerves to the heart tend to increase cardiac output by increasing both the rate of the heart beat and the strength of each beat. Impulses carried by the parasympathetic nerves to the heart tend to decrease cardiac output by slowing the rate of heart beat.

Section 4, Part A

Coronary Circulation

11. Blood leaving the heart enters the aorta en route to the organs of the body. The heart itself is one of these organs, and its thick muscular walls must be supplied with fresh blood. This is accomplished through the coronary circulation. You can see from Figure D.2 that coronary arteries arise from the base of the aorta and send blood back into the walls of the heart. These vessels branch into smaller arteries and capillaries that are imbedded in the heart muscle and, finally, blood is conveyed into the right atrium primarily through a large vein called the coronary sinus.
12. When one of the coronary vessels becomes occluded, the portion of the heart supplied by that vessel is deprived of oxygen and energy sources, and it stops contracting. This is what we call a heart attack. When a large portion of the heart is involved, it will no longer pump enough blood for survival. Coronary occlusion is responsible for about 30% of all deaths.

Section 4, Part B

13. Coronary occlusion often results from a disease called *atherosclerosis* in which fatty substances containing large amounts of cholesterol are deposited in the walls of arteries. In later stages of *arteriosclerosis*, fibrous tissue and calcium compounds intermingle with the fatty deposit so that the vessel walls become more rigid; this is called *arteriosclerosis* (hardening of the arteries).
If the fatty deposits break through the inside lining of a blood vessel, they form a surface on which the blood can clot. The vessel may become occluded at the site where the clot has formed, or the clot may break loose only to occlude another vessel downstream. Death occurs if a coronary occlusion is severe. If only a small coronary vessel is involved, the heart is weakened but may improve with time as connections with neighboring blood vessel enlarge to supply new blood.


(Please note: This article has been subdivided for demonstration purposes. It is not necessary to reproduce the text when applying the various methods to text in your textbooks. Simply orally identify breakpoints so students will be clear what parts they are to read.)
Appendix E

This form contains sixteen 90-degree angles
Appendix F
References


REFERENCES


Accountability, individual, 87
Active cognitive engagement, 23
Active participation in critical thought, 62
Analysis questions, 47
Application questions, 47
Assumptions, values, and beliefs in PDS, 11–12
Barr, C., 104
Bartlett, J. K., 97
Beck, I. L., 107, 108
Billmeyer, R., 104
Bloom, B., 44
Bloom's taxonomy of questioning, 44–46
Book talks, 115–117
Boorstin, D., 12
Brown, A. L., 54
Cai, M., 83
Calkins, L., 126, 134
Camp, D., 32
Change process, 8–9
Chronicle of Higher Education, 13
Cinquains, 71–73
Classrooms
  cooperative learning, 86–88
  as environments for thinking, 85–86
  essential elements of critical thought, 60–63
  ideal, 7–8
Clustering, 68–71
Cluster notes, 55
Coker, D., 128, 129
Collaboration among teachers, 2–3
Commentators, teachers as, 49–50
Conferencing, readers' workshop, 113–115
Confidence for critical thought, 62
Content, 10
  applying reading process to areas of, 119–120
  -area writing, 136–137
  knowledge, 12
  reading and readers' workshop, 118
Context, creating, 134
Cooperative learning
  brief exercises for problem solving and discussion, 100–103
brief strategies, 96–97
classrooms as environments for thinking and, 85–86
classroom structure, 86–88
corners activity, 93–96
defined, 86
in ERR framework, 83–84
evocation, 83–84
Formulate, Share, Listen, Create strategy for, 97
jigsaw method, 88–90
math activities, 98–99
overview, 84–85
paired predictions for, 96–97
paired reading and paired summaries for, 90–93
sample lessons, 88–96
Summarize, Pair, Share strategy for, 97
Think, Pair, Share strategy for, 97
Corners activity, 93–96
Costa, A. L., 84, 85
Cotton, K., 48
Crapsey, A., 71
Critical thought, 13, 29–30
active participation in, 62
cluster notes for, 55
confidence for, 62
creating an environment for, 60
enhanced lecturing and, 55 (box)
esential classroom elements of, 60–63
evocation of, 53–55, 63–64, 65
listening and, 63
permission, respect, and responsibility for, 61–62
realization of meaning and, 56–59, 64, 65
reflection and, 64, 65
sharing for, 62–63
Csikszentmihalyi, M., 59, 62, 142
Cubing, 73–76
Dalai Lama, 53
Degnin, F. D., 144
Dewey, J., 5, 42, 136 (box), 142, 143, 144
Discoverers, The, 12
INDEX 169

Discussion
as a learning tool, 49
and problem solving exercises for
cooporative learning, 100–103
reading in content areas and, 119–120
Dole, J. A., 107, 108
Donsereau, D., 90
Duke, N., 107, 125

Economist, ix
Eisner, E., 10
Enhanced lecturing, 55 (box)
ERR framework, 27–29
cinquain in, 71–73
clustering and, 68–71
cooporative learning in, 83–84
critical thought in, 29–30
cubing in, 73–76
examining, 21–27
experiential lesson, 19–20
as a multilitered model, 39–43
narrative text modeling of, 34–37
outcomes of using, 67–76
rationale in, 17–18
readers’ workshop and, 117–118
realization of meaning in, 23–25,
38, 39–43, 43
reciprocal teaching in, 78–79
reflection in, 25–27, 38, 52
ReQuest procedure in, 78
scrambled sequences in, 77
semantic feature analysis in, 77–78
strategies organizational chart, 30
thoughtful reading in, 105–106
writing-for-thinking strategies in, 76–79
Estes, T. H., 18, 19
Evaluation questions, 48
Evocation, 21–23
ccooporative learning, 83–84
critical thought, 53–55, 63–64, 65
learning to write, writing to learn, 126–127
outcomes of ERR framework, 67–68
realization of meaning and, 39–43
reflection, 141
scrambled sequences in, 77
semantic feature analysis in, 77–78
thoughtful reading, 104–105
Examining framework for teaching and
learning, 21–27
Expectations, PDS, 12–13
Experiential framework lesson, 19–20
Expert groups, 89

Fielding, L., 23
5E Instructional Model, 18
Fleming, A., 57
Flow, 62
Formulate, Share, Listen, Create strategy, 97
Freewriting, 8
Friedman, T., 56
Friere, P., 145 (box)

Gallery Tour activity, 102
Gardener, H., 32
Goddard, R. D., 3
Goddard, Y. L., 3
Graham, S., 129
Graves, M. F., 119
Groups
expert, 89
skills, small-, 87–88
work and processing, 88
Gunning, T., 68

“Halloween Thoughts: Bats Are Beautiful and Do
Good Deeds,” 88, 152–155
Harbison, C., 104
Harwayne, S., 126
“Heart Beat, The,” 90, 156–160
Herber, H., 18
Holubec, E., 100
Hotovsky, P., 3

Ideal classrooms, 7–8
Individual accountability, 87
Interactive Notating System for Effective
Reading and Thinking (INSEKT), 19–20
cooporative learning and, 89
realization of meaning and, 24
reflection and, 25
Interdependence, positive, 87
Interest, student, 3–5
International Reading Association, 85
Internet, 127–128
Interpersonal skills, 87–88
Interpretation questions, 47
In the Middle, 108, 110

Jigsaw method, 88–90
Johnson, D., 86, 97, 100
Johnson, R., 86, 97, 100
Kagan, S., 97, 100
Kearney, M. L., 67
Keillor, G., 128
Kikusova, S., 28, 29
King, L., 33
King, S., 131
Knowledge, bridging between known and new, 22
Kuhai, 6

Leadership, shared, 87
Learning
building bridges between known
and new knowledge, 22
centered reflection, 141–142
communities, 11
experiential framework lesson and, 19–20
motivation in, 42–43
process and content, 10
rationale for, 17–18
tool, discussion as, 49
See also Cooperative learning; ERR framework
Lecturing, enhanced, 55 (box)
Letters, literary, 115
Lewis, W. E., 128, 129
Listening and critical thought, 63
Literal level questions, 47
Literary letters, 115

Macey, R. I., 90
Making the Target Number activity, 98
Math, 161, 162
cooperative learning activities in, 98–99
reading in content areas and, 123–125
McArthur, J. W., 13
McLuhan, M., 22
Meaning, realization of. See Realization of meaning
Memory, 44–45
Meredith, K. S., 18, 28
Mini-lessons
readers' workshop, 112, 122–123
writer's workshop, 134–135
Mix, Freeze, Pair activity, 101
Moffet, J., 126, 128, 129–130
Morrow, J. B., 104
Motivation, 42–43
Mountain Tavern and Other Stories, The, 149
Movement around the class activities, 101–103
Multiprocess questioning, 46–49
Multitiered model, ERR as, 39–43

Narrative text
deciding what to ask about, 51–52
discussion as a learning tool for, 49
ERR as multitiered model and, 39–43
lesson analysis, 37–39
modeling ERR lesson with, 34–37
stopping points in, 50
teacher as commentator and, 49–50
teacher questioning and, 33–34, 43–52
wait time and, 50–51
National Assessment of Educational Progress (NAEP), 128
National Council of Teachers of Mathematics (NCTM), 124
National Endowment for the Arts (NEA), 109
Nelson, G., 98
Notes, cluster, 55
Numbered Heads Together activity, 100

Ockenga, E., 98
O'Flaherty, L., 35, 47, 51, 149

Ogle, D., 85
One Stay, Three Stray activity, 102–103
Online writing, 127–128
Organizational chart, framework strategies, 30
Outcomes expectations, PDS, 13–14
Outcomes of ERR framework
cinquains and, 71–73
clustering, 68–71
evocation, 67–68
Ownership and thoughtful reading, 109

Paired predictions, 96–97
Paired reading and summaries, 90–93
Falinscar, A. S., 54
Palmer, P. J., 1, 16
Pearson, P. D., 23
Pens in the Middle activity, 100
Perin, D., 129
Permission for critical thought, 61–62
Pinker, S., 5, 6
Plutarch, 141
Positive interdependence, 87
Predictions, paired, 96–97
Prior knowledge, 22
Problem solving and discussion exercises for cooperative learning, 100–103
Process, 10
thoughtful reading, 106–110
Professional Development Sequence (PDS), 7
assumptions, values, and beliefs affecting, 11–12
change process and, 8–9
expectations, 12–13
learning centered reflection and, 142
outcome expectations, 13–14
role of critical thought, 13
structure, xii–xiii

Questioning, 33–34, 43–44
analysis, 47
application, 47
Bloom's taxonomy, 44–46
deciding what to ask in, 51–52
discussion as learning tool and, 49
evaluation, 48
interpretation, 47
literal level, 47
multiprocess, 46–49
reading and content areas and, 119–120
stopping points and, 50
synthesis, 47–48
teacher as commentator and, 49–50
translation, 47
wait time and, 50–51

Rationale
for learning, 17–18
for realization of meaning stage, 23–25
for reflection stage, 26–27
Readers’ workshop, 110–111
applied to science, 120–123
content reading and, 118
ERR framework and, 117–118
four cornerstones of, 111–115
mini-lessons, 112, 122–123
rules, 117
Reading, paired, 90–93
In ERR framework, 105–106
process, 106–110
Reading, thoughtful
applied to content areas, 119–123
book talks and, 115–117
conferencing and, 113–115, 123
content reading and, 118
evocation, 104–105
literary letters and, 115
in math, 123–125
mini-lessons, 112
ownership and, 109
readers’ workshop for, 110–111
response and, 109–110, 115
in science, 120–123
time for, 108–109, 112–113
Reading and Learning in Content Areas, 119
Realization of meaning, 23–25, 38,
39–43, 43
cooporative learning and, 96
critical thought and, 56–59, 64, 65
reciprocal teaching in, 78–79
ReQuest procedure in, 78
Reciprocal teaching, 78–79
Reflection, 25–27, 38
critical thought and, 64, 65
evocation, 141
final, 145–146
framework strategies, 79–81
learning centered, 141–142
on narrative text, 52
Save the Last Word for Me activity, 79–80
t-charts, 80
transformative experiences and, 142–144
truth, 144–145
venn diagrams, 80–81
Renyi, J., 11, 126
ReQuest procedure, 78
Respect for critical thought, 61–62
Response and thoughtful reading,
109–110, 115
Responsibility for critical thought, 61–62
Resurgence, writing, 127–129
Richardson, J., 87
Ridgeway, V., 24
Role, audience, format, and topic (RAFT) in,
writing, 137–139
Rosenblatt, L., 5, 11
Rotating Review activity, 102
Roundtable-Round Robin strategy, 99
Ryder, R. J., 119
Sachs, J., 13
Saletan, W., 6
Sanders, N. M., 47
Save the Last Word for Me activity, 79–80
Scaffolding, 22
Schema, 22
Schemata, 22, 30
Science and readers’ workshop, 120–123
Science Curriculum Improvement
Student (SCIS), 18
Scrambled sequences, 77
Sea turtles, 14–148, 19–20
Self-directed purposes, 22–23
Self-Regulated Strategy
Development (SRSD), 129, 139–140
Semantic feature analysis, 77–78
Sequences, scrambled, 77
Shanahan, C., 118
Shanahan, T., 118
Shannon, P., 9
Shared leadership, 87
Sharing for critical thought, 62–63
Shirley, B., 14
Sill-Briegel, T., 32
Small-group skills, 87–88
“Sniper, The,” 36–37, 42–43, 149–151
discussion as learning tool for, 49
questioning about, 47, 48
stopping points in, 50
Stahl, S., 109
Stationary group activities, 100–101
Steele, J. L., 18, 28, 71
Steele, P., 71
Stirring Up the Class activity, 101
Stopping points, 50
Students
maintaining interest of, 3–5
prepared for the 21st century, ix–x
rationale for teaching, 17–18
systematic and supportive
change experience for, x-xii
Stuff of Thought: Languages as a
Window Into Human Nature, The, 6
Summaries, paired, 90–93
Summarize, Pair, Share strategy, 97
Sustained silent reading, 112–113
Synthesis questions, 47–48
Systematic and supportive
change experience, x-xii
Szasz, T., 12
Taxonomy of questioning,
Bloom’s, 44–46
T-charts, 80
Teachers
collaboration among, 2–3
as commentators, 49–50
experience and ERR framework, 27–29
outside the U. S., 1–2
professional development sequence
structure, xii–xiii
questioning by, 33–34, 43–52
Teaching, reciprocal, 78–79
Temple, C., 28
Temple, E., 96
Text. See Narrative text
Think, Pair, Share strategy, 97
Thoughtful reading. See Reading, thoughtful
Time
  critical thought an, 60–61
  reading, 108–109, 112–113
  wait, 50–51
Tonight by Sea, 96–97
Trade a Problem activity, 100–101
Transformative experiences and reflection,
142–144
Translation questions, 47
Truth and reflection, 144–145
Tschanne–Moran, M., 3
Turtles, sea, 14–148, 19–20
Twin text strategy, 32

Vaughn, J. L., 18, 19
Venn diagrams, 80–81
Voss, J., 109
Vygotsky, L., 85

Wait time, 50–51
Wells, K., 88, 152
What’s the Number? activity, 98–99
Whitehead, A. N., 12
Wong, D., 5, 30, 42, 142, 143

Workshop
  readers’ (See Readers’ workshop)
  writer’s (See Writer’s workshop)
World Is Flat, The, 56
Writer’s Almanac, 128
Writer’s workshop
  content-area writing
    and, 136–137
  creating context, 134
  establishing expectations and setting
    rules for, 135–136
  getting started with, 131
  initial struggle, 131–133
  keeping track in, 136
  mini-lessons, 134–135
  role, audience, format, and topic
    (RAFT) in, 137–139
  self-regulated strategy development
    (SRSD) in, 139–140
  three cornerstones of, 133–134
Writing
  content-area, 136–137
  creating context and, 134
  defined, 129–131
  evocation, 126–127
  -for-thinking strategies, 76–79
  online, 127–128
  resurgence, 127–129
  role, audience, format and topic (RAFT) in,
    137–139
  self-regulated strategy development
    (SRSD) in, 139–140
  writer’s workshop for, 131–140
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