
CHAPTER 3

Teaching Functions

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A. The Research Literature

In this chapter, the term *teaching functions* refers to classroom experiences that serve to move students from a lack of mastery to mastery in an academic content area. Descriptions of the most effective teaching functions usually leave little doubt about the specific student learning experiences fostered by the teacher's behavior. Doyle (1985) noted that it is the instructional function served (e.g., to increase guided practice), not the teaching behavior, that is most important.

Rosenshine and Stevens' (1986) synthesis of the research provides the following summary statement on teaching functions:

In general, researchers have found that when effective teachers teach well structured subjects, they

1. begin a lesson with a short review of previous, prerequisite learning.
2. begin a lesson with a short statement of goals.
3. present new material in small steps, with student practice after each step.
4. give clear and detailed instructions and explanations.
5. provide a high level of active practice for all students.
6. ask a large number of questions, check for student understanding, and obtain responses from all students.
7. guide students during initial practice.
8. provide systematic feedback and corrections.
9. provide explicit instruction and practice for seatwork exercises and, where necessary, monitor students during seatwork.

The major components in systematic teaching include teaching in small steps (with student practice after each step), guiding students during initial practice, and providing all students with a high level of successful practice. Of course, all teachers use some of these behaviors some of the time, but the most effective teachers use most of them almost all the time [p. 377].

Good and Grouws (1979) found that when teachers increased their emphasis on the following five teaching functions, their students achieved more than students of teachers who did not emphasize them.

1. Check the previous day's work and reteach where necessary.
2. Present new content or skills, proceeding rapidly but in small steps, while giving detailed instructions and explanations.

3. Have students practice the material while providing feedback and corrections.
4. Have students do independent practice.
5. Provide weekly and monthly reviews.

The presence of the teaching functions is important, but the timing and amount of time devoted to each function is also significant. For example, guided practice is important, but only if it is conducted at the right time and for long enough to ensure that the student error rate is low before engaging in independent practice. The timing and amount of each activity must be related to its effect on students.

In commenting on the teaching functions highlighted by the research on effective teachers, Rosenshine and Stevens (1986) noted that the specific functions are consistent with the theoretical recommendations of Gagne (1970), the practical guidance from Hunter's essential elements for lesson design (Hunter & Russell, 1981), and a wide range of research findings on the procedures used by effective teachers.

Teaching Function Concepts

The majority of teaching functions considered important by researchers have been consolidated into the following five groups: (a) daily reviews and prerequisite checks, (b) presentation of new content, (c) guided student practice, (d) independent student practice, and (e) weekly and monthly reviews (see Figure 3.1).

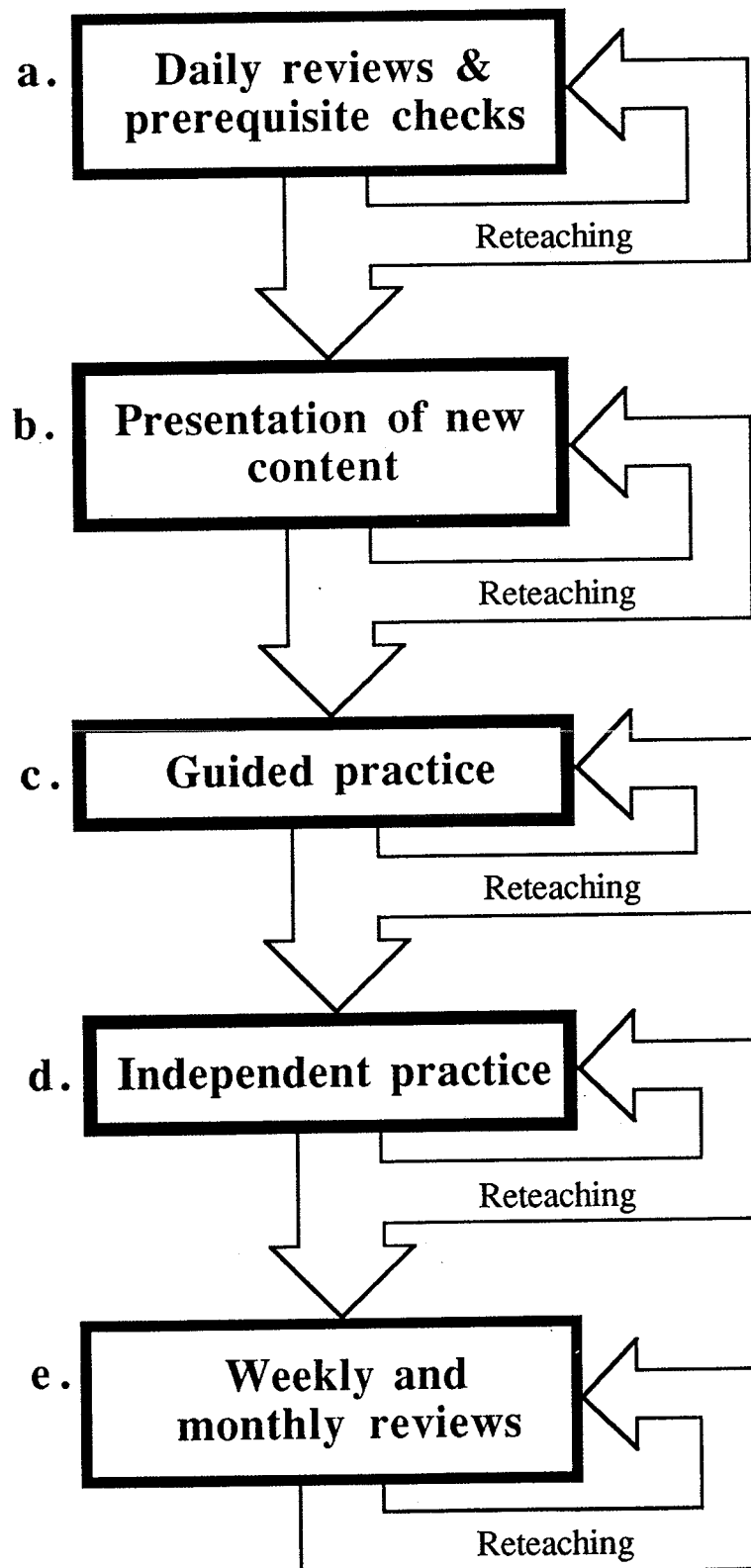
1. Daily Reviews and Prerequisite Checks. Typically, the effective teacher will initiate a lesson with a series of related activities that will serve to (a) review the material covered in the previous lesson, (b) check on homework, and (c) check on the prerequisite skills needed for the new content that will be covered in the lesson.

Daily reviews. One of the most effective ways to initiate a lesson is to review the previous lesson by presenting two or three problems that require a written response by all students. If these problems are on the screen, chalkboard, or worksheet in front of the students when they enter the classroom, and if all the students are actively responding to the problems within the first sixty seconds of the lesson, a number of important things happen, including:

- a. A work-oriented tone is established. If a lesson starts with a long, rambling discourse by the teacher and passive participation by students, a very different tone may be set for the lesson.
- b. Since the review problems cover material previously taught, the error rate should be low. This means that most students will start the lesson on a successful note. Consistent demonstra-

FIGURE 3.1

Major Teaching Functions



tions of success are one of the best ways to facilitate the development of appropriate attitudes toward the content and the instruction.

- c. Since there are often class management problems associated with transitions between lessons, and since some of these may have to do with factors outside the teacher's classroom, the teacher is in a good position to deal with problems if the majority of students are actively engaged in responding to the review problems at the start of a lesson.
- d. Most class management issues are usually associated with a few students who come to class without any interest in participating. If these students get the message within the first minute of class that they will be expected to participate and that the teacher will take the time to check on them individually, then management problems will be reduced.

Homework. There is a lack of consensus in the research literature on the importance of large amounts of homework, but there is some agreement on the importance of the following guidelines:

- a. Requiring a session of at least fifteen minutes per night per subject is helpful.
- b. The homework should serve to consolidate and review.
- c. Students should not be encountering new material or have high error rates in homework assignments.
- d. Homework should be checked promptly.

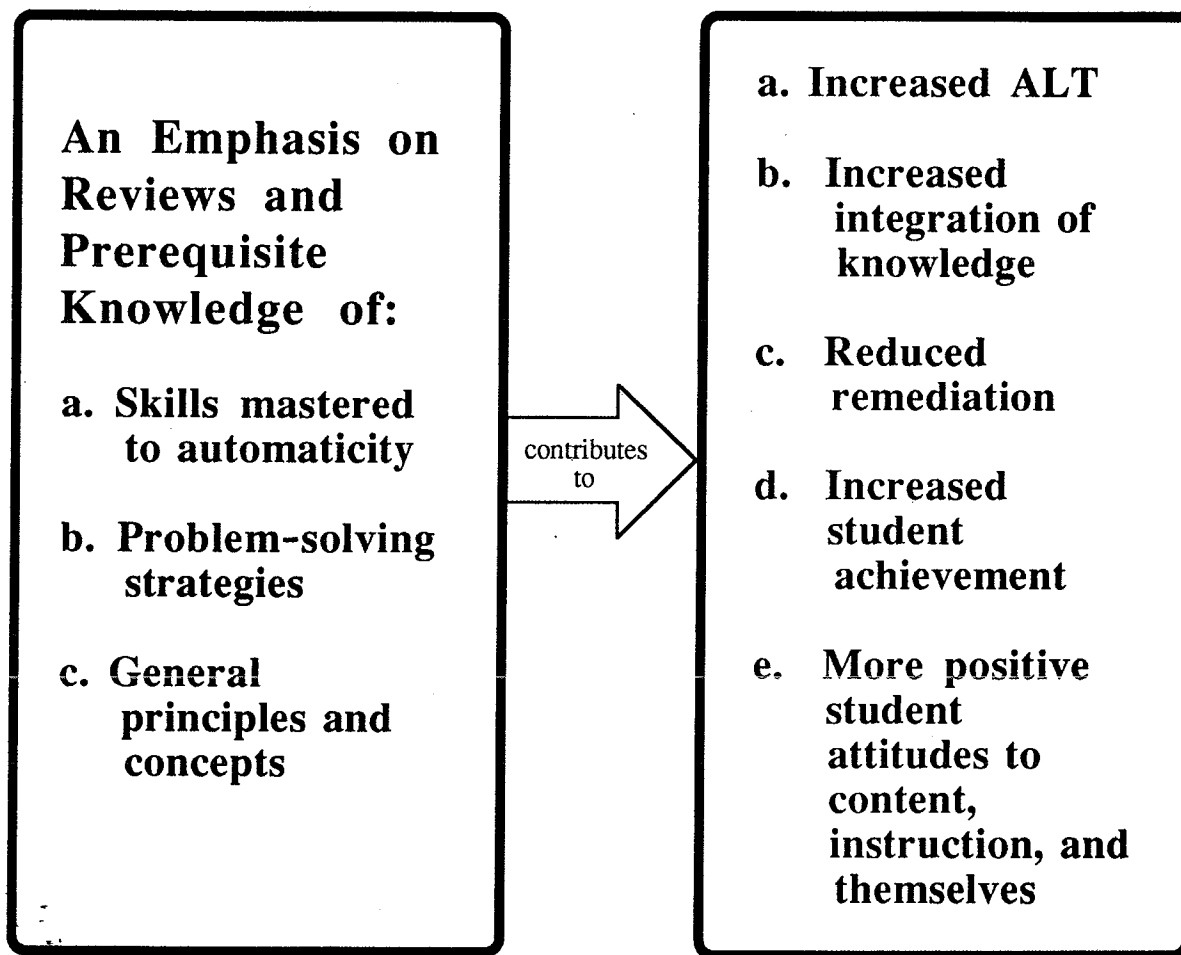
Prerequisite skills. One of the characteristics of a master teacher is the appropriate treatment of prerequisite skills. The master teacher knows what new material is likely to be difficult for students and which prerequisite skills are important for the successful introduction of new material. Rather than place students in remedial situations, the master teacher will try to prevent errors and misconcepts by making sure that the new material is introduced in small steps and that students demonstrate mastery of the critical prerequisite skills before starting the sequence of small steps.

Prerequisite skills are typically considered at the start of a course of study and at the beginning of each lesson that introduces new content. Most effective teachers use a combination of group and individual instruction. Group instruction can be very effective if the teacher assesses the students at the beginning of the course to determine how the skills they bring to the class will match up with the course curriculum. The appropriate management of prerequisite skills calls for an in-depth understanding of instruction, curriculum, and student learning. Such understanding does not come easily; it is characteristic of an individual who has made a major commitment to the science and art of teaching.

The prerequisites needed to ensure high levels of success in the early stages of acquiring new knowledge include (a) skills mastered to automaticity, (b) problem-solving strategies, and (c) general principles and concepts (see Figure 3.2).

FIGURE 3.2

Making Instruction Meaningful: The Role of Reviews and Prerequisites



- a. Skills mastered to automaticity. One should not be teaching complex algorithmic procedures, such as long division, if students are struggling with the prerequisite facts in subtraction and multiplication. Lessons in reading comprehension will have little value if the needed decoding skills have not been mastered.
- b. Problem-solving strategies. Even the simplest of work problems requires the mastery of strategies to determine what information is provided and what information is needed to solve the problems. Such strategies will be prerequisites for more advanced word problems.
- c. General principles and concepts. Commenting on earlier research on the difference between novice and expert problem solving in physics, Doyle (1985, p.64) stated, "a teacher needs

to describe the connections between lessons, in order to build broad understandings of content and place individual tasks within a wider context of understanding. In addition, a teacher needs to design tasks that require students to integrate information across individual lessons and class sessions." In the teaching of earth science, the convection cell is a concept that helps explain the movement of air in the atmosphere, the deep ocean currents, and the movement of magma inside the earth. Once taught, the concept of the convection cell will be prerequisite knowledge to help integrate information across several earth science topics. Doyle noted that the better problem solvers possessed "domain-specific knowledge in the subject area" and could interpret problems in terms of the underlying principles and concepts.

Reteaching. Student errors should be minimal for daily reviews, homework checks, and prerequisite skill checks. All these activities involve previously taught material. If most of the students do not demonstrate mastery, reteaching should be conducted immediately. Certainly one would not want to introduce any new material if less than 80 percent of the class did not demonstrate mastery of important prerequisite skills. It would be far better to spend the rest of the class period teaching the prerequisite skills. Rather than place a large percentage of the class in a remedial situation, it would be better to delay the new material a day so as to help ensure initial success once it is introduced.

Because remedial instruction is expensive in teacher and student time, and destructive for the attitudes of both students and teacher, there is no economy of time or effort in the premature introduction of new material.

2. Presentation of New Content. Evertson, Emmer, and Brophy (1980), writing in the *Journal of Research in Mathematics Education*, reported that the most effective teachers spend about twenty-three minutes per day on the presentation of new material through demonstrations, discussions, and lectures. The least effective teachers spend only eleven minutes per day on the same activities.

The following guidelines for presenting new material were prepared by Rosenshine and Stevens (1986, p. 381), based upon their review of the research literature.

1. Clarity of goals and main points.
 - a. State the goals or objectives of the presentation.
 - b. Focus on one thought (point, direction) at a time.
 - c. Avoid digressions.
 - d. Avoid ambiguous phrases and pronouns.
2. Step-by-step presentations.
 - a. Present the material in small steps.

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- b. Organize and present the material so that one point is mastered before the next point is given.
 - c. Give explicit, step-by-step directions (when possible).
 - d. Present an outline when the material is complex.
 3. Specific and concrete procedures.
 - a. Model the skill or process (when appropriate).
 - b. Give detailed and redundant explanations for difficult points.
 - c. Provide students with concrete and varied examples.
 4. Checking for students' understanding.
 - a. Be sure that students understand one point before proceeding to the next point.
 - b. Ask the students questions to monitor their comprehension of what has been presented.
 - c. Have students summarize the main points in their own words.
 - d. Reteach the parts of the presentation that the students have difficulty comprehending, either by further teaching explanation or by students tutoring other students.

Clarity of presentation is emerging as an important component of all aspects of the presentation of new content. Brophy (1987) wrote,

Students achieve more when their teachers make clear presentations marked by continuity and precision of language rather than interruptions due to false starts or meandering into side issues, hemming and hawing, or vague terminology. Most of the presently available information is on factors that detract from clarity, although recent work has begun to develop methods of conceptualizing and measuring positive aspects of clarity such as sufficiency of definitions, accuracy of examples, and explicitness of explanations [p. IV-133].

3. Guided Student Practice. Guided student practice serves as a bridge between activities designed to present new material and independent student practice. The guided student practice is integrated into activities designed to present new material. In math instruction, for example, guided practice could involve having the student practice one or several steps in the algorithm used to solve a single calculation or problem. In the more advanced stages of presenting new material, guided practice could involve the presentation of several math problems and the associated feedback procedures.

Guided practice and independent practice represent different points on a single continuum, so no absolute dividing point can be established to discriminate between the two related activities. Guided practice should be conducted in small steps and should be intensely supervised. It should prevent the development of consistent error patterns and inappropriate practices. This means that

guided practice must be designed and implemented so that errors are identified and reteaching conducted immediately.

Hunter (1984), in discussing the importance of guided practice, stressed the need for students to practice their new knowledge or skill *under direct teacher supervision*. Hunter further noted that "New learning is like wet cement; it is easily damaged. An error at the beginning of learning can be easily 'set' so that it is harder to eradicate than had it been apprehended immediately" (p. 176).

The research literature has consistently stressed the importance of appropriate amounts of guided practice for all learners, but nowhere is this guided practice more important than with low achievers. It has been noted that "The important element seems to be the provision of controlled practice with positive teacher feedback" (Voelker Morsink, Chase Thomas, & Smith-Davis, 1987, p. 292). The fact that certain members of the class will require more guided practice than others suggests that each lesson should contain a certain amount of time in which the higher-achieving students are working on independent practice, while the teacher is working closely with low-achieving students on guided practice.

The effectiveness of guided practice can be evaluated by measures of student success in independent practice. If students are at least 80 percent successful when they begin the subsequent independent practice, then guided practice has been appropriately conducted.

4. Independent Practice. In learning a new skill or concept, the students progress through two phases: acquisition and consolidation. Teaching activities designed to support the presentation of new content and guided student practice contribute to the acquisition phase; activities concerned with review and independent student practice contribute to the consolidation phase.

The transition from guided practice to independent practice should not occur until students are at least 80 percent successful in their guided practice. The independent practice should continue past the point at which the student is 100 percent successful. Independent practice should continue until the use of the skills becomes automatic.

Samuels (1981) identified two levels of independent practice: a *unitization* level and an *automaticity* level. At the unitization level, the students are integrating their skills with previous knowledge. They make few errors, but learning is not easy; they usually get the right answer with a considerable investment of effort. At the automaticity level, the students are performing the skills successfully, easily, and without having to think through the steps involved in performing the skill. When the automaticity level has been reached, the skill has been *overlearned*. Rosenshine and Stevens (1986) made the following observation with regard to the importance of overlearning:

Overlearning is particularly important for hierarchical materials such as mathematics and elementary reading. Unless there is overlearning to the point of automaticity, it is unlikely that the material will be retained. Furthermore, hierarchical material requires the application of previously learned skills to subsequent new skills. The advantage of automaticity is that students who master the material can then concentrate their attention on learning new skills or applying the skills to new situations. For example, automaticity of decoding skills frees the students' attention for comprehension, just as automaticity of computation frees the students' attention for mathematical problem solving [p. 386].

5. Weekly and Monthly Reviews. There are two types of reviews: (1) daily reviews and (2) weekly and monthly reviews. As previously discussed, daily reviews facilitate the introduction of new content. The weekly and monthly reviews are designed to ensure that content previously mastered is not forgotten. Good and Grouws (1979) noted that effective teachers were devoting between 15 and 20 percent of instructional time to weekly and monthly reviews.

A weekly comprehensive mastery test can serve the dual purpose of reviewing material and providing a valid measure of student progress for grading purposes. A test that diagnoses how much material a student is retaining is also providing the teacher with feedback on the quality of instruction. If certain skills are consistently giving large numbers of students problems on mastery tests of retention, the teacher must reexamine the instructional presentation and student practice activities that were associated with the acquisition and consolidation of the skill.

Getting It All Together to Meet Student Needs

Adjusting Resources. The point has been made by Rosenshine and Stevens (1986) that all teachers will at some time use all the important teaching function skills. The effective teacher is the individual who uses the skills in the right amount at the right time, in response to student needs.

Individualized instruction is not primarily concerned with the physical individualization of the instructional setting; rather, it stresses the monitoring of students as individuals to ensure that instruction, whether in group or individual settings, is consistent with their needs.

Noli (1980) noted:

Student engagement rates are higher when students are involved in more academic interaction with the instructor. Engagement rates are higher in a group setting than during independent seat-work. Engagement rates are higher when students receive more monitoring or help from an instructor [p. 220].

The teacher has to balance the facility of group settings to ensure high engagement with the facility of individual settings to match instruction to different student needs. The more diverse the entering skills of students, the more difficult the balancing process will be.

In an overview of the research on practices that foster student learning, it was noted that

It will not be suitable to use one organizational pattern for the entire day The teacher must devise some workable system using different settings (group work and seat work) for different students in different content areas at different times during the day, and keep the whole system adaptable to changes in student needs during the year [Fisher et al., 1980, p. 32].

Table 3.1 is an example of how a fifty-minute period might be used to ensure an appropriate balance among teaching functions, group instruction, and seatwork to meet the needs of all students in a timely fashion.

During Segments 1 and 2, the teacher would spend time on the classroom floor monitoring student performance to determine which students need additional guided practice during Segment 3. If major problems were detected in Segment 1, the teacher would delay the introduction of new content and reteach the prerequisite skills.

The lesson structure in Table 3.1 assumes that the teacher assessed the entry skills at the beginning of the course to ensure that all students could benefit from the course of instruction.

The scheduling of independent practice as the final segment of a lesson helps minimize the management problems associated with the physical individualization of instructional settings. These management problems were documented by Copeland (1987) as follows:

The degree of multiplicity of dimensions, immediacy, and simultaneity required to keep 25 students highly involved in the

TABLE 3.1 Example of a Lesson Schedule

Lesson Segment	Time	Instructional Setting	Teaching Function
1	5-10 minutes	Group	Review and check on prerequisites.
2	20-25 minutes	Group	Presentation of new content integrated with guided practice.
3	20-25 minutes	Individual	Independent practice for average and above-average students. Additional guided practice for low achievers.

number of different activities necessary for individualization may put such tasks beyond the information-processing capacity of many teachers. If so, teachers' often-observed inability to implement highly structured recommendations for individualization may be better understood [pp. 234-235].

By scheduling the independent seatwork and additional guided practice after the group presentation of new content and associated guided practice, the following is achieved:

- a. The majority of the class is working relatively independently on the same set of skills.
- b. The error rate for most students will be low, because most are doing independent, not guided practice.
- c. If students experience a smooth transition with well-prepared materials, the entry into independent practice should not have been disruptive.
- d. By this time in the lesson, the teacher should have a good understanding of which students have problems.

The end result should be a classroom that is easier to supervise than a classroom in which the individual instruction occurred earlier, or one in which the introduction of new content was being conducted in individual settings.

Safety Nets and Individual Differences. Individual differences certainly give rise to management problems. There seems to be a widespread misconception that all individual differences come from the individual student. In fact, the breadth of individual differences is a function of both the contributions of the individual and the quality of instruction. An educational system should not be repressing the unique essence of the individual, nor should it be creating individual differences in achievement by failing to address individual knowledge deficits in a timely manner.

Block (1980) called for more emphasis on a "self-correcting system of schooling." He noted that many existing practices are "error-promoting" and require that

Educators must give special attention to a wider range of learner management problems. They must, for example, "individualize" their instruction in the face of unnecessarily wide ranges of individual differences in students' readiness to learn. This typically entails redoing portions of their predecessors' jobs as well as trying to do their own [p. 98].

The message is clear. All teachers must make certain they have a systematic set of classroom practices that ensure that errors are detected and reteaching conducted in a timely manner. Such detection and reteaching will

- a. Reduce future classroom management problems by reducing unnecessary individual differences

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- b. Promote student achievement and more positive student attitudes by providing more consistent demonstrations of success
 - c. Provide a more effective working environment for colleagues receiving the students

Daily Safety Nets. A safety net has two components: error detection and reteaching. A daily safety net can be established by ensuring that every lesson is systematically planned so that errors can be detected and reteaching conducted based on these errors. For example, in the lesson structure shown in Table 3.1, there is an opportunity for error detection and reteaching in Segment 1. Even more important will be the error detection and reteaching that occurs in Segments 2 and 3. If more than 20 percent of the class experience difficulty with the introduction of new content, reteaching should be conducted immediately. If only a few students are experiencing problems, the teacher may note the students; during Segment 3, the teacher will be free to provide additional guided practice with these few children while the others work independently on prepared seatwork activities. With such a safety net, even the students who have major problems will receive reteaching that addresses their needs within the same lesson that the problems were detected.

The maintenance of daily safety nets does not come easily. It requires a mobile, alert teacher, constantly monitoring the high-risk students. Also necessary are well-prepared practice materials that will provide meaningful experiences for the majority while the teacher spends time with students in difficulty during the last part of each lesson. The quality of the salvage program will be consistent with the physical and cognitive energy expended by the teacher.

Weekly and Monthly Safety Nets. As noted earlier, the more effective teachers systematically set aside 15 to 20 percent of the allocated time for weekly and monthly reviews. In the study conducted by Good, Grouws, and Ebmeier (1983), one day each week (usually Monday) was set aside for weekly and monthly reviews. For three of these review days each month, the teachers emphasized the content covered in the previous week. On one day each month, the teachers emphasized the content covered during the previous month. If each of these review days is initiated by a diagnostic test of the content covered during the previous week or month, the test itself will serve as a review, and the teacher will have the information needed to conduct reteaching for the remainder of the lesson. If major problems are encountered, the teacher may continue the reteaching into the next lesson. By keeping track of the problems encountered during the weekly reviews, the teacher will be able to develop well-targeted diagnostic tests for the monthly reviews.

Planning for Differences. Some students require more practice than others (Block, 1980). One strategy for varying the amount of practice is to prepare three parallel sets of practice examples for each lesson. Although each set of examples is different, each covers the same concepts at the same level of difficulty. One set is used during the guided practice that all students participate in (see Segment 2 in Table 3.1). The second set is used during the last part of the lesson (see Segment 3 in Table 3.1), while most of the students are experiencing independent practice and several students are receiving guided practice. For homework, the students who were doing independent practice in Segment 2 complete the second set for homework. The students who used the second set for guided practice then complete the third set for homework.

The practice of preparing three parallel sets of examples will accomplish two important objectives. First, it facilitates a successful transition from guided to independent practice. The probability of success in independent practice will increase, because the same problem types will have been encountered and practiced during the preceding guided practice. Second, those students in need of extra practice will receive it, with examples that emphasize conceptual understanding rather than rote learning. Repeated practice with the same set of examples would emphasize rote learning.

Expectation of Success. The research literature has noted that effective instructional programs are characterized by an *expectation of success*, which can be facilitated if

- a. The teacher confidently and briskly presents a carefully validated sequence of instruction.
- b. The students experience recurring demonstrations of success, particularly in the initial stages of learning a skill.

Effective teachers have been described as “those who almost never use criticism; they have and communicate high expectation; present task-oriented instruction, reinforce on-task behavior, and use high rates of the contingent praise” (Voelker Morsink, Chase Thomas, & Smith-Davis, 1987, p. 291).

In essence, the critical attributes of a classroom climate that has an expectation of success include:

- a. Proven successful curriculum sequences and teaching methods
- b. Consistent success experiences
- c. Consistent and timely recognition of student success

Compromises and Reality. Brophy (1987) summarized one of the realities of teaching as follows:

The total instructional program will be a compromise constructed in the belief that it will allow the teacher to meet more of the needs of more of the students than any of the feasible alternatives—it will not be an ideal program that continually meets each individual student's needs. The need to accept compromises by trading off classroom management benefits against costs in instructional quality and efficiency increases in relationship to the size and heterogeneity of the class [p. IV-123].

Lightfoot (1983), in her analysis of the characteristics of effective secondary schools, noted that a concern for the weakest members of the school community was a characteristic common to the effective schools she observed. It is important that safety nets and similar strategies be integrated and accepted instructional components as teachers confront the compromises and realities of teaching. Such demonstrated concern for the weaker members of the school community creates a beneficial affective and academic climate for all.