Chapter 5

HOMEWORK AND PRACTICE

Mrs. O'Ryan could see firsthand the effects of giving her third graders specific feedback on completed homework assignments. When she simply assigned a letter grade, she found that students' work didn't improve as quickly as when she wrote comments on their homework. For example, as part of a unit on pond life, Mrs. O'Ryan gave students a homework assignment of writing about an animal that commonly lives in or around a pond. She told students that she would grade their work in terms of the details included and how well they organized their papers, as well as their spelling and punctuation.

Mrs. O'Ryan created a grading sheet that she gave to students before they started their work. It described the criteria she would use to grade each assignment. As she reviewed each student's paper, she assigned separate grades and wrote short remarks, such as the following:

Content: A "I can tell that you know a lot about ducks. You have included some very nice details. Good work."

Spelling and Punctuation: B "You have made a lot of progress on spelling and punctuation since your last paper. Remember to use a dictionary if you are not sure how to spell a word. And remember to capitalize the first letter of the names of books and videos that you refer to in your writing."

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Homework and practice are instructional strategies that are well known to teachers. Both provide students with opportunities to deepen their understanding and proficiency in any content area.

Homework gives students an opportunity to learn new information and skills *and* to practice skills they have recently learned. But practice is an effective instructional strategy even when it is not part of a homework assignment. Thus, this chapter includes a separate discussion of specific ways in which practice can be used to enhance students' mastery of skills they are learning.

HOMEWORK

1. Establish and Communicate a Homework Policy.
(See Illustration 1)

Students and their parents need to understand expectations related to homework. What is the purpose of homework? How much homework will be assigned? What are the consequences for missing or

late homework assignments? How should parents be involved in their child's homework? A district, a school, or a teacher can establish and communicate a homework policy to answer questions such as these and to set feasible and defensible expectations of students and their parents. A clearly articulated homework policy can decrease tensions about homework that might arise among parents, teachers, and students. Further, following explicit homework policies can enhance student achievement. A sample homework policy for a district is shown in Illustration 1.

2. Clarify the Purpose of Homework Assignments.
(See Illustration 2)

Many times, students do not understand the purpose of homework assignments. Consequently, they simply might want to "get through it" and complete the work. Homework provides opportunities for students to practice skills, prepare to learn new information, or elaborate on introduced material. Articulating the purpose of homework relative to these goals can help teachers and students focus on learning. For example, practicing a skill requires a different kind of assignment and a different focus on the student's part than learning new information. To increase speed and accuracy on a particular skill, a student might break an assignment into chunks and time herself as she completes each section.

Students can use an assignment notebook to keep track of their daily assignments. The school or teacher might provide students with assignment sheets that are similar to the pages found in a business day planner or a teacher's daily planner. Illustration 2 shows an example of a homework assignment sheet.

At the beginning of the year, the teacher might explain the purpose of assignment sheets and show students how to complete them. Filling out an assignment sheet clarifies for students what they are supposed to do and *why* they are supposed to do it. Further, the process helps students link their tasks with the information and skills they are learning.

3. Use Different Strategies for Giving Students Feedback on Homework.
(See Illustration 3)

Timely and specific feedback on homework can improve student achievement. However, teachers do not have enough time to provide extensive feedback on every homework assignment. To avoid overburdening themselves, teachers can explore different strategies to ensure that students receive feedback on homework, as exemplified in Illustration 3. For example, teachers might set up opportunities for students to share their work with one another and offer feedback, have students keep a journal in which they record self-assessments of their understanding and progress, or keep their work in a portfolio, which the teacher might examine later.

ILLUSTRATION 1: SAMPLE HOMEWORK POLICY

This letter explains the district's homework policy. Please read the policy with your child (or children) so that you understand the expectations of students and parents with regard to homework. We believe following these guidelines will help decrease tension associated with homework and increase your child's learning.

For your child to be successful with homework, she or he needs

- **A place to do homework.** If possible, your child should do her homework in the same place — an uncluttered, quiet space to study.

- **A schedule for completing homework.** Set a homework schedule that fits in with each week's particular activities.

- **Encouragement, motivation, and prompting.** It is not a good idea to sit with your child and do homework with him. He needs to practice independently and to apply what he has learned in class. If your child consistently cannot complete homework assignments alone, please contact the teacher.

- **Understanding of the knowledge.** When your child is practicing a skill, ask her which steps she finds difficult and easy; ask how she plans to improve her speed and accuracy with the skill. If your child is working on a project, ask her what knowledge she is using to complete the work. If your child consistently cannot answer these questions, please contact the teacher.

- **Reasonable time expectations.** Although there might be exceptions, as a general rule, your child should do homework for approximately ten times her grade level in minutes (for example, a second grader would spend 20 minutes, a fifth grader 50 minutes).

- **A bedtime.** When it is time to go to bed, please stop your child, even if he has not finished the homework.

Please return the policy with the appropriate signatures, acknowledging that you have read and discussed the policy with your child.

_____ _____

Parent's Signature Student's Signature

ILLUSTRATION 2: HOMEWORK ASSIGNMENT SHEET

Subject: _____ Date due: _____

What I have to do tonight: _____

_____

_____

_____

_____

_____

Purpose of the assignment: _____

_____

_____

_____

_____

_____

Information I need to know or skills I need so I can complete the assignment:

_____

_____

_____

_____

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_____

ILLUSTRATION 3: VARY FEEDBACK ON HOMEWORK *mathematics*

Ms. Kendall asked her third grade students to keep track of their own performance when they practiced a skill as homework. Three times a week, she assigned three sets of five computation problems. The students knew to time themselves as they completed each set of problems. Each student completed a chart that showed the total time for each practice set and the number of problems they completed correctly. In this way, students charted their own progress and could identify areas they needed to focus on. Ms. Kendall also encouraged students to request a conference with her if they had questions about their progress or wanted specific feedback from her.

PRACTICE

1. Ask Students to Chart Their Accuracy and Speed.
(See Illustration 1)

Practice is essential to students learning to perform new skills and processes quickly and accurately. Keeping track of their speed and accuracy helps students learn by making them more aware of their progress. One useful way to track speed and accuracy is to chart them, as exemplified by Illustration 1.

2. Design Practice Assignments That Focus on Specific Elements of a Complex Skill or Process.
(See Illustration 2)

When students are practicing a complex, multi-step skill or procedure, such as the writing process or the scientific method, they might benefit from "focused practice" that targets one specific aspect of the process. Focused practice can be particularly effective when students are having difficulty with a specific step or aspect of a complex procedure, as exemplified by Illustration 2.

3. Help Students Increase Their Conceptual Understanding of Skills or Processes.
(See Illustration 3)

Many teachers identify the skills students must learn and then plan time for instruction and homework. Typically, a teacher might build in time for modeling the process, time for guided practice, and time for independent practice sessions.

However, it is also important for students to understand how a skill or process works. For example, a student may be able to compute percentages when given a page of math problems but not able to solve a word problem that requires the use of percentages. If the student doesn't know what a percentage means, or which number to divide by which, he will not be able to apply his computation skills in a problem-solving situation. During curriculum planning, a teacher must make a commitment to increasing students' understanding of skills and processes and then plan activities to achieve this goal, as exemplified by Illustration 3.

ILLUSTRATION 1: CHART SPEED AND ACCURACY *reading bar graphs*

Mr. Gallegos wanted to help his students improve their ability to reading bar graphs because he knew it was an important skill to success in daily life. In addition, the state test required students to read bar graphs in the social studies and the math sections. Mr. Gallegos had taught the steps for reading a bar graph and had set aside time for his students to practice in class. Now he wanted students to work on improving their speed and accuracy.

Twice a week, Mr. Gallegos gave students a bar graph with a set of questions to answer. He asked students to time themselves as they answered each question, keep track of the number of questions they answered correctly, and then chart their progress. Students could decide how to chart their progress. Some used line graphs; some kept track using a matrix for speed and accuracy; and some used bar graphs.

Based on the information students recorded, Mr. Gallegos focused his instruction on aspects of interpreting bar graphs that seemed to be giving students trouble. As students' understanding improved, so did their accuracy. The charts helped students see their progress as they worked toward mastering their ability to read bar graphs.

ILLUSTRATION 2: FOCUSED PRACTICE *writing*

Carly had been writing essays and stories all year, but she still had trouble with transitions between ideas and paragraphs. She knew that most of her transitions sounded forced and awkward — if there was any transition at all — but she didn't seem to be making any progress.

Mrs. Shaw, Carly's teacher, noticed that other students were having similar difficulties with transitions, so she decided to focus her instruction and give students opportunities to focus their practice. For the next two weeks, Mrs. Shaw gave students models of good transitions, assigned practice for them to rewrite awkward transitions, and gave them paragraphs that needed transitions.

When it was time to write the next essay, Mrs. Shaw reminded students to incorporate what they had learned about constructing transitions. Carly noticed that as a result of the intensive practice, her transitions were smoother and her writing was better overall.

ILLUSTRATION 3: INCREASE CONCEPTUAL UNDERSTANDING *golf*

When it was time for the golf unit, Mr. Montgomerie's physical education students couldn't wait to get outside and hit some balls. Mr. Montgomerie, however, had other plans. Before the students ever hit a golf ball, they were going to learn why golf is often called a "mental game." He wanted students to focus on their conceptual understanding of the skills and processes important in golf.

For one class period, students watched videos of drives and putts and discussed what Mr. Montgomerie called the "physics of the slice." The next day in small groups, the students began practicing their own drives and putts. Mr. Montgomerie went from group to group and videotaped individual students practicing. He reminded them to pause occasionally to think about what they were doing.

The next day the groups watched their practice drives on tape. Mr. Montgomerie and the students discussed the advantages and disadvantages of variations in the process. Some of them noticed that students who kept their lead arm straight when driving created a huge arc and drove the ball farther. They also observed that students with straight lead arms turned their shoulders when swinging the club rather than bending their elbows. Other students pointed out the importance of maintaining eye contact with the ball. The students took notes about what they were going to practice when they went back outside.

For homework, students described what they had learned about their drives and why they thought certain things they changed worked or didn't work.

THEORY AND RESEARCH IN BRIEF • • •
Homework and practice

HOMEWORK — It is no exaggeration to say that homework is a staple of American education. By the time students reach the middle grades, homework has become a part of their lives. The reason commonly cited for homework makes good sense: It extends learning opportunities beyond the confines of the school day. This appears to be a good idea given that schooling occupies only about 13 percent of the waking hours of the first 18 years of life, which is less than the amount of time students spend watching television (Fraser, Walberg, Welch, & Hattie, 1987).

Extending the influence of schooling makes sense from the perspective of the amount of time it would take to adequately address the content in the various subject-matter standards documents. For example, when the National Education Commission on Time and Learning (1994) held a hearing to discuss the needed changes in instructional time, the following comments were recorded by representatives from various subject-matter organizations:

> *Arts.* "I am here to pound the table for 15 percent of school time devoted to arts instruction," declared Paul Lehman of the Consortium of National Arts Education Association.
>
> *English.* "These standards will require a huge amount of time, for both students and teachers," Miles Myers of the National Council of Teachers of English told the Commission.
>
> *Science.* "There is a consensus view that new standards will require more time," said David Florio of the National Academy of Sciences. (p. 21)

Homework is a complex topic. Research shows that a number of factors are critical, including the grade level of the students and the type of feedback given. (Feedback is discussed in more depth in Chapter 8, Setting Goals and Providing Feedback.) Some of the general findings on the research about homework are reported in Table 5.1. Specific findings are reported in Table 5.2

As Table 5.1 shows, the overall effect of homework on students' achievement is noteworthy. Yet, as Table 5.2 indicates, the influence of homework varies depending on a number of factors. For example, after studying the relationship between time spent on homework and achievement, Keith's data (1982) indicate that on average, for every 30 minutes of homework per night, overall GPA increased by approximately ½ point.

Table 5.1: General Research Findings for Homework

Synthesis Study	Focus	No. of Effect Sizes	Ave. Effect Size	Percentile Gain[a]
Paschel, Weinstein, & Walberg, 1984	General effects of homework	81	.36	14
Graue, Weinstein, & Walberg, 1983	General effects of homework	29	.49	19
Hattie, 1992	General effects of homework	110	.43	17
Ross, 1988	General effects of homework	53	.65	24

[a]These are the maximum percentile gains possible for students currently at the 50th percentile.

Table 5.2: Specific Research Findings for Homework

Study	Focus		No. of Effect Sizes	Ave. Effect Size	Percentile Gain[a]
Walberg, 1999	Homework with teachers' comments as feedback *(may or may not be graded)*		2	.83	30
	Homework that is graded		3	.78	28
	Assigned homework but not graded or commented on		47	.28	11
Keith, 1982	Time spent on homework		1	.68	25
Cooper, 1989	Grade level of students	4-6	13	.15	6
		7-9	5	.31	12
		10-12	2	.64	24

[a]These are the maximum percentile gains possible for students currently at the 50th percentile.

Another set of studies (see Walberg, 1999) found that the effects of homework vary depending on whether homework is graded or teachers have provided students with feedback. Walberg reports that homework assigned but not graded or commented on generates an effect size of only .28, representing a percentile gain of 11 points. However, when homework is graded, the effect size increases to .78, and homework that teachers provide written comments for has an effect size of .83, representing a percentile gain of 30 points. Finally, it is important to note the differential effect of

homework on students at different grade levels. In general, the older the student, the more influence homework has on his or her learning.

PRACTICE — It is intuitively obvious that practice is necessary for learning knowledge of any type. It's not surprising, then, that research indicates that practices significantly enhances learning. Some of the results of studies that have synthesized the research on practice are reported in Table 5.3.

Table 5.3: Research Results for Practice

Synthesis Study	Focus	No. of Effect Sizes	Ave. Effect Size	Percentile Gain[b]
Ross, 1988	General effects of practice	9	1.29	40
Bloom, 1976[a]	General effects of practice	7	.54	21
		3	.93	32
		10	1.43	42
Kumar, 1991	General effects of practice	5	1.58	44

[a]Multiple effect sizes are listed for the Bloom study because of the manner in which effect sizes were reported. Readers should consult that study for more details.
[b]These are the maximum percentile gains possible for students currently at the 50th percentile.

The effect of practice on learning can be substantial, as the effect sizes and percentile gains shown in Table 5.3 indicate. But other research tells us how learning occurs over time. Studies by Anderson (1995) and Newell and Rosenbloom (1981) clearly indicate that many practice sessions typically are required for students to reach a high level of competence, the most significant gains are made in the initial practice sessions, and future practice sessions add incrementally smaller gains. These important points are clearly demonstrated by the computations shown in Table 5.4.

First, notice how much practice it takes for students to reach a high level of competence in a skill or process. Students do not reach a high level of competence until they have engaged in many practice sessions. For example, they do not reach 80 percent competency until they have practiced 24 times.

Second, notice how gains in learning become smaller as the number of practice sessions increases. For example, it takes five practice sessions for students to reach a little more than 50% competency, but after ten sessions students' competency is only 65%, after fifteen, 73%, and after 20, 77%.

On one hand, these statistics paint a somewhat discouraging view of continued practice. But other research points to critical benefits gained from practice.

One finding from the research on practice that has strong classroom implications is that students must adapt or "shape" skills as they are learning them. During this shaping phase, learners modify the way they use the skill, become aware of potential problem areas as well as variations in how the skill can be used, and learn to use the skill in different situations.

The importance of the shaping phase cannot be overstated, yet this crucial stage of learning is often not given the necessary time and attention. Skipping or shortchanging this stage of learning can result in students' internalizing errors that are difficult to correct. It can also mean that students will not gain the conceptual understanding that is essential to truly mastering a skill or process.

In fact, when students lack conceptual understanding of skills and processes, they are likely to use procedures in shallow and ineffective ways. The Mathematical Science Education Board (1990) warns that skill learning in itself does not ensure conceptual understanding. Researchers Clement, Lockhead, and Mink (1979) have shown that even a solid knowledge of the steps involved in algebraic procedures does not imply in most cases (over 80 percent) an ability to correctly interpret the concepts underlying the procedures. Further, several studies have shown that students are able to use

Table 5.4: Increase in Learning Between Practice Sessions

Practice Session #	Increase in Learning	Cumulative
1	22.918%	22.918
2	11.741%	34.659
3	7.659%	42.318
4	5.593%	47.911
5	4.349%	52.260
6	3.534%	55.798
7	2.960%	58.754
8	2.535%	61.289
9	2.205%	63.494
10	1.945%	65.439
11	1.740%	67.179
12	1.562%	68.741
13	1.426%	70.167
14	1.305%	71.472
15	1.198%	72.670
16	1.108%	73.778
17	1.034%	74.812
18	.963%	75.775
19	.897%	76.672
20	.849%	77.521
21	.802%	78.323
22	.761%	79.084
23	.721%	79.805
24	.618%	80.423

mathematics procedures most effectively when they have first learned them at a conceptual level (Davis, 1984; Romberg & Carpenter, 1986).

To help foster the shaping process, research suggests that it is not appropriate to engage students in rushed practice of multiple examples, but, rather, to give them an opportunity to practice a few examples in depth at a slower pace. Unfortunately, Healy (1990) reports, American educators tend to prematurely engage students in a heavy practice schedule and rush them through multiple examples. In contrast, as Healy reports, Japanese educators attend to the needs of this important phase of learning by slowly walking students through only a few examples:

> Whereas American second graders may spend thirty minutes on two or three pages of addition and subtraction equations, the Japanese are reported to be more likely at this level to use the same amount of time in examining two or three problems in depth, focusing on the reasoning process necessary to solve them. (p. 281)

Practice is a critical part of learning that must be well structured and well thought out to enhance learning. Although further practice does not result in significant gains in skill development, this additional time may be essential for students to gain the conceptual understanding that is critical to true learning.