



Research Synthesis on Study Skills

Studying—learning from reading—is probably the most important skill students acquire in school. Unfortunately, studying is a difficult skill to learn and many students never become proficient at it. The act of studying involves a complex interaction of four major variables: (1) the nature of the criterion task or goal for which the student is preparing; (2) the nature of the material the student is studying; (3) the cognitive and affective characteristics of the student; and (4) the strategies the student uses to learn the material (Jenkins, 1979; Bransford, 1979; Brown and others, 1981).

The nature of the criterion task. Expert students structure their study activities according to what they know about the criterion task. The more specific the student's knowledge about the task, the greater the effectiveness of studying. For example, when studying for a test, the student needs to know the number and types of questions, the duration of the test, the extent to which external aids can be used, and the evaluative criteria to be applied.

The nature of the study material. The expert student considers the nature of the material to be learned. Texts, for instance, have predictable logical structures or organizational patterns. Students who identify and use the inherent text structure are better able to learn from it (Meyer, 1975, 1979; Shimmerlik, 1978; Goetz and Armbruster, 1980; Walker and Meyer, 1980). Expert learners know how to use headings, introductions and summaries, topic sentences, and key relationship signals ("because," "on the other hand," "first, second . . .") to determine the structure.

Student characteristics. Expert students study the material sufficiently to meet the demands of the criterion

task. They have a repertoire of both cognitive and metacognitive skills. They comprehend the information and form a representation of it in memory. In addition, they are aware of their own cognitive resources and of the match between these resources and the demands of the study situation. They control or regulate their cognitive resources during the process of studying so that learning takes place (Baker and Brown, in press).

Expert students capitalize on their own background knowledge—both of the criterion task and of the nature of the study materials, as well as their existing knowledge of the topic or content area—which has a marked effect on comprehension (Anderson and others, 1977).

Strategies used by students. Expert students engage in study strategies that draw on their cognitive and metacognitive abilities. These strategies include (1) focusing attention, (2) encoding (getting the information from the page into the head), (3) monitoring comprehension, and (4) taking corrective action when comprehension fails.

Students cannot learn all of the information set before them; they must be selective. In focusing on information relevant to the criterion task, the student increases inspection time and exerts greater cognitive effort or concentration—a burst of processing energy.

Encoding Variables

The mental processes occurring during periods of focused attention are only conjecture at this point. However, two theories suggest in a very general way some encoding variables relevant to studying. According to the principle of "levels of processing" (Anderson, 1970, 1972; Craik and Lockhart, 1972), input is analyzed in a hierarchy of processing stages, from analysis of physical or sensory features to extraction of meaning. "Depth of processing" implies a greater degree of semantic analysis,

which contributes to longer remembering. In other words, what is stored in memory is determined by the kinds of operations performed on the input. The "levels of processing" theory implies that performance on criterion tasks requiring comprehension and recall is facilitated to the extent that students attend to, interact with, and elaborate on the underlying "meaning" of the text.

According to the principle of "encoding specificity" (Tulving and Thomson, 1973), the way in which information is encoded determines how it is stored, which in turn determines the retrieval cues the student uses to recall it. Thus, the optimal form of encoding is ultimately dependent on the nature of the criterion task. This theory implies that studying is facilitated to the extent that students know the performance requirements of the criterion task and encode the information in the best way to meet those requirements.

Together, then, the principles of encoding specificity and levels of processing suggest that studying is effective when students process the "right information" in the "right way," where "right information" is defined with respect to the criterion task, and "right way" connotes a relatively deep or meaningful level of involvement with the text.

Proficient students also evaluate their comprehension and progress. Comprehension monitoring usually takes place automatically. Processing proceeds smoothly as long as the student encounters no problems, such as those that result when information in the text is unexpected or unfamiliar. When comprehension falters, the student slows down and allocates extra time and effort to the problem. The expert student takes remedial action by ignoring the problem if it does not interfere with learning the information relevant to the criterion task or by storing the problem as a question to be answered through reflection, re-reading, reading ahead, or consulting another source.

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Research on Common Study Techniques

Teachers and students have traditionally believed that underlining, taking notes, outlining, writing summaries, and asking questions help students do better on tests. Unfortunately, research has failed to confirm the benefits of these techniques or to find one technique that is superior to others. However, some important conclusions emerge when the research is considered from the perspective of the four variables discussed earlier.

One conclusion is that any study technique *can* help if it enables students to process the right information in the right way. A correlate is that blindly applying a typically effective study technique does not ensure effective studying.

Consider note-taking. Students may merely copy the text, processing it only superficially—or they may use their own words, elaborate on the text, or take notes that promote deeper processing. Students may also take notes more or less randomly—or they may take notes strategically, selecting information that is important, relevant, perplexing, or worthy of extra processing. In other words, what students “do” with note-taking affects study outcomes.

In the few studies where note-taking has been more effective than other study techniques, students were induced to take notes in a way that entailed deeper processing or processing compatible with the requirements of the criterion task. For instance, Shimmerlik and Nolan (1976) asked subjects to take notes that either maintained the author's organization or imposed an alternate organization. Students who reorganized the passage in their notes recalled more, possibly because reorganizing the passage forced deeper processing of the text. Subjects had to understand the original organization as well as think through how the content and relationships could be restructured to form the new organization. This extra processing was well suited to the free recall test, in which the student's score reflected ability to reproduce content and relationships in the absence of retrieval cues.

In another example, Bretzing and Kulhavy (1979) assigned students to one of five tasks: (1) write summaries of each page, (2) take para-

phrase notes of the main idea, (3) take verbatim notes, (4) record words beginning with a capital letter, or (5) read only. Students who took summary notes or paraphrase notes performed best on a test of constructed response items requiring integration of information. These results are presumably attributable to the greater cognitive effort and deeper processing involved in writing summaries and taking paraphrase notes, as well as the better match between encoding activities and performance requirements.

As with note-taking, students can apply other study techniques with varying degrees of effectiveness. For example, students can write summaries that entail deep processing of top-level information and fail miserably on a test of detail questions. Or they can ask themselves detail questions about the text and perform poorly on essay questions. They can also force information into an outline format without processing the text sufficiently to make good decisions about the superordinate, subordinate, and coordinate relationships. The effectiveness of any study technique depends on how it is used and whether the way it is used matches the demands of the criterion task.

A second major conclusion from the research on study techniques is that students often have to be carefully trained to use a technique to advantage. We have found positive results for outlining only in studies in which subjects received extensive training in how to outline (Anderson and Armbruster, in press). In studies in which subjects were *told* but not *taught* to outline, outlining was not more effective than other study techniques. Quite possibly, these subjects did not engage in the processing required to outline effectively.

Students also need training in self-questioning techniques. Although self-questioning *can* be effective even for untrained students, lower ability students appear to require instruction in order to use self-questioning to advantage (Andre and Anderson, 1979).

There is some evidence that students who can already study effectively may find training in a new strategy to be more harmful than helpful (Wong and Jones, 1981). Therefore, training may need to be reserved for students who have not

yet learned effective techniques on their own.

Guidelines

Brown and others (1981) have provided some useful guidelines for training students to “learn how to learn from reading.” These guidelines bring us full circle to the four interacting variables: the nature of the criterion task, the nature of the material to be studied, the general characteristics of the student, and the strategies employed by the student to learn the material. Training in study skills should make students aware of these four factors and how to use them to advantage.

- Students should be instructed in the importance of knowing about the criterion task. They should be taught the demands associated with various tasks, how to determine the actual or probable task to follow a particular study session, and how to match study techniques to task demands.

- Students should be taught about the properties of texts (including structure) that affect learning, how to identify those properties in texts, and how to use those properties while studying.

- Students should be taught about the role of motivation, ability, and background knowledge in studying. They should be taught how to increase their motivation and concentration, how to work with their strengths and weaknesses, and how to apply their existing knowledge.

- Students should know *why*, *when*, and *how* to use particular study strategies. They should be taught specific rules for applying strategies and techniques as well as rules for monitoring and checking to ensure that the strategies promote the desired result.

Finally, students cannot learn very much about studying by being taught how to study “in general.” Studying is not a general process; each content area has its own types of criterion tasks, texts, and preferred study strategies. Content-area teachers are in the best position to teach the skills necessary for each particular discipline. Teachers also have a *responsibility* to teach study skills, rather than erroneously assuming that students already know how to study. Teachers need not sacrifice content matter; in fact, teaching students to

study will facilitate teaching the content. Our suggestions do not imply a drastic overhaul of the curriculum. These guidelines can be incorporated into the kinds of exercises, assignments, and tests that teachers already employ. ■

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Highlights from Research on Study Skills

Students should be taught the study technique that best fits the situation for which they are studying. Any technique can aid study if students use it to process the right information in the right way.

The process of studying involves four major factors.

The Study Task. The more students know about the event for which they are studying, the more effective their studying will be. For example, if the study task is a test, they need to know the number and types of questions to be asked, the duration of the test, the extent to which external aids may be used, and the evaluative criteria applied.

Students should be instructed in how to analyze the study task and choose the appropriate studying strategy to best accomplish the task. Students need to know that for a test of detailed questions, for example, the study technique of self-questioning about content is more effective than writing summaries of the material.

Material. Effective learners use the organizational patterns of the material to be studied, such as headings, introductions, summaries, topic sentences, and key relationship signals.

Instruction should convey to students the properties of materials, how to identify them, and how to use them while studying.

Student Characteristics. Students' comprehension is affected by their background knowledge of the topic, the nature of the task, and the structure of the materials to be studied. Expert students are also motivated to study. They understand the cognitive skills of studying and how to make use of them.

Instruction should involve students in applying their own motivation, ability, and background knowledge in studying.

Strategies. Expert students (1) focus on relevant information; (2) relate to the material in a meaningful way, thus committing it to memory; (3) monitor comprehension; and (4) take corrective action when comprehension fails.

Instruction should teach students why, when, and how to use study techniques. This includes rules for applying strategies and techniques, and rules for monitoring comprehension and employing corrective techniques.

Each content area has its own types of tasks, materials, and strategies for study. Content area teachers should incorporate applicable study skills into the classroom instruction.

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