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Linking Metacognition to Classroom Success

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Traditionally, the task of teaching students the fundamentals of study strategies has been in the domain of elementary educators. For the most part, their efforts have been satisfactory for students at this stage of intellectual growth. However, problems begin to arise as elementary students enter secondary education and begin their transition to the next developmental stage. The study strategies they developed in the elementary school are often incomplete for the secondary school setting with its more formalized learning environment.

In response to this, and to the ever-increasing problem of retaining students in school by preventing failure, secondary teachers are showing interest in helping their students master skills necessary to study and learn. Teachers and administrators who recognize the importance of learning skills also understand the importance of going beyond the classroom framework to develop the whole person. To these professionals, helping students develop useful study habits and positive attitudes and ultimately graduate is as important as the subject matter that may be their expertise.

Secondary teachers must realize that students were not likely taught how to adapt their study habits to a variety of learning situations during the elementary years. In fact, any attempt to do so would probably have met with little success, given the nature of children at that stage of intellectual development. It is therefore critical for secondary teachers to help students mature the learning skills they need for success. While the goal of improving study habits and further developing the skills the students already have is important, current methods used to reach desired outcomes must be modified and enhanced if success is to be achieved. Success should not be defined solely from the standpoint of student mastery of subject matter, but rather from the perspective of helping students develop a major self-control process, metacognitive skills processing.

Metacognitive skills are related to thinking about thinking, and more precisely, thinking about one's own learning. Teaching about this

process should not be random or capricious. It can be accomplished in any classroom with a teacher who understands the learning process and wants to help students achieve. Students who develop metacognitive skills are far more likely to be able to make the changes needed in their own study habits and learning strategies when faced with unfamiliar tasks or challenges than students who do not.

What Is Metacognition?

Metacognition, or the act of thinking about one's own thinking, is necessary to ensure efficient learning. Dirkes (1985) points out that students who direct their own thinking commonly do three things: connect new information to former knowledge; select thinking abilities directly; and relate time and degrees to certainty of purpose. Dirkes refers to these activities as executive strategies and defines awareness of them as metacognition. Costa (1984) defines metacognition as the ability to know what one doesn't know. He further states, "Some people are unaware of their own thinking process. They are unable to describe the steps or strategies they use during the act of problem-solving. They cannot transform into words the visual images held in their minds. They seldom evaluate the quality of their own thinking skills" (p. 198).

The importance of spending effort on the development of thinking-about-thinking skills in all young people becomes especially clear when it is realized that students who are able learners develop these skills intuitively. The simplest example of a metacognitive skill is when students realized that after doing poorly on a test, they are not learning through the use of one study technique and will therefore need to try a different one. Brown and DeLoache (1977) believe that determining a desired goal and planning the steps required to achieve that goal are desirable metacognitive skills.

Many students have a goal of improving a grade at some point in their education. Fulfilling that goal can become a source of serious frustration. There are several causes for the lack of academic success many students experience, including immature metacognitive knowledge and strategies as well as the lack of motivation, attention, and effort to employ strategic activity (Ryan, 1982). Failing to determine a goal for learning or failing to think about the steps required to achieve that goal may also be included here. Students often realize that they do not understand what was read or heard, but then fail to act on this understanding. This practice can reinforce an existing negative view of their ability or lead them to believe that they are poor learners. A more precise explanation would be that they are too passive in their learning attempts. They do not practice the self-control and self-correction necessary to become better learners. It is interesting to note that at a time when these skills should be developing, the drop-out problem drops in.

Developing Metacognition

Self-interrogation is an important metacognitive technique. By asking questions of themselves, students can monitor themselves, predict and hypothesize, assess feelings of understanding or lack of understanding in order to choose and employ a self-correction strategy, and integrate new information with existing information. Examples of questions that monitor learning or comprehension include the following: Should I slow down here? Can I skip the additional clarifying explanation? Can I picture this situation or information in my mind? To predict and hypothesize, students might ask themselves such questions as, What do I think will happen next? Do I think this is fiction or nonfiction? Was that piece of information related to what I read on the last page or paragraph?

Assessing one's feelings of understanding is also important for comprehension and learning. Students could ask, Did this make sense? Can I say this in my own words? Can I make a judgment now? To assess their lack of understanding, students might ask, Is this part harder than previous information? Do I get what the author is saying here? What does this word mean? Will this make sense later? This type of introspection is critical because the selection and employment of correction strategies is

based upon it. Students need to know if they should reread, continue, slow their speed, find assistance, or choose a different strategy.

After learning new information, the self-interrogation should not stop. Students should continue to reflect on their information by asking themselves such questions as, Can I make some generalizations, and are they fitting? Can I draw some conclusions, and are they plausible? Is this similar to anything that I already know?

The development of metacognitive skills is not inherited; nor is it achieved through passive attendance at school each day. It is a process that must be presented to adolescents with a cohesive, carefully planned strategy. Those who have experienced the intrinsic satisfaction that comes from being in control of their own educational success know the motivational factor that is directly connected with that control.

Using Metacognitive Skills

To examine metacognitive abilities, it is important to look at the difference between what efficient, mature learners do and what less proficient, immature learners do during their study process. Most basic is the notion that mature learners treat studying as a purposeful, attention-directing, self-questioning act, while less mature learners possess naive theories about what it takes to learn new information and to meet certain task and text demands (Brown et al., 1982). Mature learners engage in purposeful strategic learning activities tailored specifically to the demands of each task. If necessary, they develop new strategies. Less mature learners, on the other hand, do not necessarily introduce appropriate learning strategies. If they do, they may be inflexible in adapting these strategies to different text or task situations. Furthermore, they are often impeded by inferior, inefficient strategies which result in only partial success but are consistently applied in a variety of situations. Such inflexibility of approach may stem from the fact that students feel most comfortable using one kind of strategy, do not know any other strategies, or fail to realize it may be their strategic action, rather than their lack of ability, impeding their learning.

As learners mature, they become increasingly able to predict the essential elements of the text (Brown and Smiley, 1977). Evidence of this was seen during research with young through college-age learners. Some of the students spontaneously began to underline or take notes. Not only was this study strategy used spontaneously, the ideas highlighted were also considered the important elements of the text. Students induced to adopt a note-taking strategy, however, were not as sensitive to the main elements; their notations were more random. The very immature learners underlined almost all of the text when told to underline. Their skill did improve with instruction but never reached the level of the spontaneous user.

Students who are able to extract main ideas will benefit from study time. They know what to attend to first so that more detailed information may be built upon basic ideas. Mature learners use this building process to flesh out meaning. Developing learners also use it but take more trials to come upon the strategy themselves (Baker, 1980). Unless basic ideas are extracted, study time becomes an exercise in passive rereading or in rote memorization without understanding.

Self-testing, or rehearsal, is another appropriate study technique for all learners because it helps them realize what has not been learned and acts as a rehearsal procedure for learning. Rehearsal allows a transfer of information from short-term to long-term memory (Bransford, 1979). The more rehearsal attempts, the greater the probability of retention of information. The success of information retrieval for an exam or a problem-solving task depends on how specifically the information was encoded during the time of acquisition and on the quality of the retrieval schemes in the mind of the learner. Questioning gives practice in retrieving information and thus reduces the amount of forgetting. Therefore, self-interrogation is an effective study technique for recall of information and is more efficient than other

techniques such as passive, desperate rereading. It is important for students to engage in self-interrogation because they often don't realize that they have inadequate preparation for a test or other similar task until it is too late.

Deciding what information needs further attention before a detailed understanding is achieved can also be accomplished through attempts to summarize materials. Baker and Brown (1980) suggest five operation for effective summarizing: delete redundance; delete trivia; provide superordinate terms or labels for items that can be grouped; select topic sentences; and invent topic sentences where missing. Summarizing can be taught and is an important check that a student both understands and remembers the material. Some students find that studying from a summary is easier than returning to the complete text.

Learning information does not always mean that the learner will be able to transfer it to different contexts, problems, or roles. Effective learners hypothesize different contexts in which information may be used. Experiences in multiple contexts increase the probability of effective transfer (Brown et al., 1982). Another element that plays a role in effective transfer is acknowledging that certain information, formulas, or concepts are meant to be applicable to various situations. Students need to see how things can be applied generally so that they too learn to put their learning in different contexts. Students also need to see how a new situation is related to one previously encountered. An understanding of situational relationships can aid information transfer.

Research Findings

Subject-matter teachers are aware of the importance of fostering good reading and study habits among students if their own efforts in the classroom are to be fruitful. Accordingly, much of the early research in the teaching of metacognitive skills has come from reading. Andre and Anderson (1979) determined that the metacognitive technique of self-generated questions during study led to improved performance on tests requiring comprehension. A recent study by Stevens (1988) demonstrated that training remedial reading students in metacognitive strategies improved their ability to identify the main idea of expository paragraphs.

Research in a variety of disciplines supports the need for metacognitive training for general classroom success. As an example, Bean et al. (1986) reported on the effect of metacognitive instruction on a tenth-grade world history class. Their study showed that the use of graphic organizer construction (a technique that expands study strategies beyond outlining) was enhanced by metacognitive training. The authors further noted that "secondary students are eager to expand their metacognitive strategies" (p. 167). Some students reported using the strategies in their biology class, especially on difficult sections of the text.

Research also suggests that metacognitive strategies training can help students be successful as young adults. Mikulecky and Ehlinger (1986) studied the higher level literacy demands placed on young people competing in today's workplace by investigating the effects of metacognitive instruction on electronic technicians. Electronic technicians, according to the study, spend nearly 2.5 hours daily in job-related reading and writing. Results indicate that "metacognitive aspects of literacy did consistently and significantly correlate to job performance" (p. 41). Also significant for students directed toward a profession requiring higher education is a study by Lundeberg (1987). This study centered on the reading strategies used by lawyers and law professors, since "legal educators profess to build minds rather than fill them" (p. 409). Lundeberg's findings indicated that metacognitive strategies significantly improved comprehension, especially of beginning law students.

As these studies suggest, waiting for students to mature into skilled learners is not an educationally viable position. There are many strategies to be learned, and while some students may discover them intuitively, others will require induced learning.

Conclusion

The key to better education for the complex world of the future is producing more efficient, independent learners who can complete their educational goals. It is only through a combination of three kinds of knowledge — strategic learning-to-learn skills, metacognitive abilities, and factual information from content courses — that students will develop self-direction and self-regulation abilities for learning. All teachers, at all levels, need to show students that successful learning is a continually active process requiring internal monitoring and control over a learning situation. Students can be shown strategies for improvements; moreover, they can be encouraged to develop them for themselves.

Individuals play the central role in their own learning. Students who do not take responsibility for their thinking and learning may exhibit symptoms of learned helplessness. If they see no relation between effort and the attainment of their goals, they may become lethargic (Thomas, 1979). Their efforts could be curtailed and their self-esteem might suffer. Sometimes after acquiring this helpless attitude, students fail to perform tasks that they could do at a previous time. Therefore, aside from the academic advantages of the learning-to-learn skills, there may be social and emotional advantages in affording students the opportunity to reduce passive, helpless attitudes that result in only a minimal effort to avoid a failing grade or even dropping out.

Considering that forgetting occurs rather quickly after exposure to material, content-area teachers who just fill students with factual knowledge soon find that students are left with very little of anything important. Thoughtful teaching professionals must move away from antiquated approaches toward a credible pedagogical alternative of teaching students to control their own learning. However, as was pointed out by Porter and Brophy (1988), "...helping students is not sufficient by itself to insure mastery of those strategies" (p. 79). Teachers need to incorporate these strategies into their lesson structure and encourage their use for class so that the strategies can be mastered. Teachers can determine if their efforts to teach and improve metacognitive skills have been successful by asking specific questions about what is going on in their students' minds as they think through various problems. Students who are developing metacognitive skills will be able to describe their thinking process, mental organization, and future strategies when coping with a problem.

As Wiens (1983) points out, "As students enter adolescence, their ability to engage in abstract thinking increases and their 'self-consciousness' takes on new meanings with real implications for being able to control their own thinking and behavior. An understanding of metacognitive skills can greatly enhance an adolescent student's ability to use appropriate strategies in learning" (p. 144).

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