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Reading, Writing and...Metacognition? A Possible New Staple of American Education

Preschoolers in a private school in Boston listen intently to a lesson in classical music. A Montessori school in Seattle offers units in French, German, Latin, Spanish, and Japanese. A student in Hawaii finishes his square dancing class and gathers his yarn to head to knitting class. Schools nowadays boast a class selection far more varied than simply reading and writing and 'rithmetic. Schools' repertoires have been heavily supplemented, with class additions ranging from "cultural studies" to "environmental awareness." Although some of these additions have a legitimate place in the schoolhouse, many educators dismiss most of these topics as soft disciplines, nods to demands of political correctness. However, one new topic that has caught the interest of the educational world is neither of these. Experts feel that a subject called metacognition should become as integral a part of American education as the three "R's" listed above.

Metacognition focuses on teaching students how to learn instead of teaching them facts. One article defines it thus: "Learning to monitor the quality of one's thought and the products of one's efforts is the hallmark of what is meant by metacognition."[1] Another states "Metacognition is composed of one's own understanding of process, task nature, and emotional state."[2] **In metacognition all learning is deliberate and active: the learner is conscious of his learning, checking himself and his degree of understanding, explaining the material to himself, re-working the concepts to ensure his mastery.** As the word itself implies, metacognition takes place on a higher level, the study strategies taking place even while the brain deals with information encountered for the first time.

Metacognition is not a new phenomena created by educational researchers. Accomplished learners and experts at the top of their fields automatically engage in metacognition. "Mature learners question and elaborate their own knowledge and the content of the text, testing their degree of understanding by thinking of counter-examples and testing possible generalizations, by attempting to apply their new-found knowledge, and by a variety of debugging ploys that force them to correct their misunderstandings."[3] The benefits of "thinking like experts" are obvious: studies show that "mature thinkers" and experts learn more easily than novices and process information more effectively. Teaching schoolchildren to "metacognate" facilitates their learning in the classroom while better preparing them for life than standard methods. "Monitoring and reflecting on the process and products of one's own learning is crucial to successful learning as well as to 'learning how to learn," write White and Fredrickssen.[4] Schoenfeld chimes in "To the degree that we train our students to think independently and to use the knowledge at their disposal, we will have succeeded as teachers."[5] This success becomes more viable as new research proves metacognitive methods can be taught, and that school children can learn them.

In a middle school in the Midwest, a group of seventh graders demonstrated their ability to learn metacognition as part of a study of expertise and metacognition. Through analyzing thinking habits of experts, natural "metacognators," researchers Annemarie Sullivan Palinscar and Ann L. Brown isolated four concrete, teachable learning activities: "summarizing, questioning, clarifying, and predicting."[6] Using "reciprocal teaching," the researchers taught these four strategies to seventh graders labeled "poor readers."[7] They worked with the students one-on-one, prompting them to give recaps of what they had just read, to make up possible test questions about the material, and to guess what might happen next. After less than three weeks of metacognition learning rather than their normal reading class (about thirty minutes per day), the subjects gained up to three years on the Gates-MacGinitie Standardized Comprehension Score, averaging over a year's performance improvement.[8] A control group of students whose one-on-one sessions focused on "locating information" training also showed improvement, but nowhere near the success of the reciprocal teaching group.[9] If this study is any indication, (and other concurring studies employing metacognition in other disciplines and ages prove that it is)[10] metacognition training works.

It makes sense that metacognition works. Barbara White and John Frederikson write "Much of learning is a conscious process that incorporates metacognitive knowledge and skills as key components . . . These metacognitive skills can be acquired, and so, the argument goes, students can 'learn to learn."[11] Metacognition is a conscious process, and therefore it boils down to teaching them the basic skills, then reminding them to employ these skills. On a deeper level, metacognition makes sense as well. Popper explains this a little when she writes "We can grasp a theory only by trying to reinvent it or to reconstruct it . . . . The process of understanding and the process of the actual production . . . are very much alike."[12] Reaching full understanding of an idea often mandates recreating the idea. The author of a book or the scientist who proves a hypothesis understands their respective concepts very well indeed. By engaging students in processes such as putting an explanation into their own words or predicting an outcome, the students mimic the very action originally carried out by those who created the explanation or the piece. Therefore they come to understand the concept at a level closer to that of the author.

Not only does metacognition bring students closer to the creator of concepts, it also closes the gap between student and teacher. **Metacognition demands that the student act as her own teacher, producing summary questions and quizzing herself.** Seeing the learning process "from the other side of the desk" helps students understand what teachers expect of them. "Introducing students to the standards by which their work will be evaluated enables students to better understand the characteristics of good performance."[13] The students' personal evaluation of their learning leads to better results when the teacher evaluates them. Likewise, acting as the teacher exposes students to how much they have to learn. "By monitoring the effectiveness of one's own learning and uses of resources," writes Lin, "students may be able to see the need to pursue a new level of learning and understanding."[14] With metacognition, students who previously skimmed a chapter, retaining only the shallowest ideas, now pause to rectify the lack of depth in their understanding. By asking themselves for causes and effects and summing up main ideas, their comprehension reaches a previously unattainable level.

Students skilled in metacognition become teachers not only in that they teach themselves, but also in that they can watch themselves in the process of learning, a previously unconsidered event. Schoenfeld writes "My students rarely if ever realize that they can think, that they can watch themselves thinking, and that they can improve their problem solving performance by reflecting on their successes and failures."[15] With metacognition, students begin to view themselves as learners. Once students learn to observe their own learning, they can more easily improve on their areas of weakness. This stage of self-awareness is integral to successful learning. Metacognition "allows the student to reflect, monitor, and revise the process and products of his or her own learning" writes Lin. This strategy is effective both in and outside the classroom: "Helping students develop abilities to monitor and revise their own strategies and uses of resources may enable them to improve general learning expertise that can be used in a wide variety of settings."[16] Scardamalia and Bereiter quote a fifth grade girl commenting on a recently completed metacognition unit: **"I think I can tell if I've learned something when I'm able to form substantial theories that seem to fit in with the information that I've already got . . . I'm able to piece things in that make sense and then to form theories on the questions that would all fit together."**[17] This fifth grader can now evaluate her own levels of understanding, and can discern when she needs further explanation before she reaches understanding. In this way, the burden of assessment moves in part from the teacher to the student. Now the student can determine mastery or lack thereof in a subject long before the unit test rolls around.

In metacognition, teachers move from a "dispenser of knowledge" role to that more akin to an athletic coach. Using this analogy, Alan Schoenfeld points out that to perfect a skill coaches and athletes often "review slow-motion videotapes of that student performing the act in question, to isolate minor points that could stand improvement."[18] In fact, a coach works to impart on the athlete an awareness of what a move should feel like. This enables athletes to correct themselves in the course of play and act as their own skill coach. Coaches rarely work themselves out of a job, due to the physical impossibility of the athlete watching herself in real time. However, using metacognition, teachers can work themselves out of a job, and this is, obviously, the highest level of successful teaching.

[1] Barbara Y. White and John R. Frederiksen, "Inquiry, Modeling, and Metacognition: Making Science Accessible to All Students," *Cognition and Instruction,* Vol. 16, No. 1 (1998), 79.
[2] Xiadong Lin and James D. Lehman, "Supporting Learning of Variable Control in a Computer-Based Biology Environment: Effects of Prompting College Students to Reflect on Their Own Thinking, *Journal of Research in Science Thinking*, Vol. 36, No. 7 (1999), 840.
[3] Annemarie Sullivan Palinscar and Anne L. Brown, "Reciprocal Teaching of Comprehension-Fostering and Comprehension-Monitoring Activities," *Cognition and Instruction*, Vol. 1, No. 2 (1984), 120.
[4] White and Frederiksen, 28.
[5] Alan H. Schoenfeld, "Problem Solving in the Mathematics Curriculum: A Report, Recommendations, and an Annotated Bibliography," *MAA Notes*, No. 1 (The Mathematical Association of America: 1983), 51.
[6] Palinscar and Brown, 120.
[7] Palinscar and Brown, 126.
[8] Palinscar and Brown, 154.
[9] Palinscar and Brown, 145.
[10] See Lin and Lehman as well as Scardamalia.
[11] White and Frederiksen, 4.
[12] K. R. Popper and J. C. Eccles, *The Self and its Brain* (Berlin: Springer-Verlag, 1977), 17.
[13] White and Frederiksen, 28.
[14] Lin and Lehman, 839.
[15] Schoenfield, 6.
[16] Lin and Lehman, 839.
[17] Marlene Scardamalia and Carl Bereiter, "Technologies for Knowledge-Building Discourse," *Communications of the ACM*, Vol. 36, No. 5 (May 1993), 38.
[18] Schoenfield, 15.