STANLEY POGROW

Teaching Thinking to At-Risk Elementary Students

Evidence from the Higher Order Thinking Skills program suggests that at-risk students show little understanding of content without first receiving concentrated instruction in *understanding* itself.

Can a thinking skills program generate major gains in basic skills of "at-risk" students? The answer appears to be "yes." Indeed, evidence from the HOTS (Higher Order Thinking Skills) program suggests that a thinking skills approach can produce even greater gains in basic skills than overreliance on drill, mastery learning, direct instruction, or any other current school improvement methodology.

HOTS is a thinking skills approach to Chapter I for grades 4–6. In this program all supplemental drill and content instruction is replaced by general thinking activities specially designed to transfer to gains in basic skills by increasing the conceptual ability of students to learn difficult content the first time it is taught in the regular classroom.

The program appears to be successful with a wide range of students. Basic skills gains are exceeding national averages. Last year for first-year Chapter I students in six schools the program produced average gains (fall to spring) of 13 percentile points (9 Normal Curve Equivalents [NCE]) in reading and 17 in math (11.5 NCE), the latter despite the absence of specific math activities in the first year of the curriculum. More important, students' scores continue to improve after the first-year spurt.

Tucson Unified School District found that HOTS students in primarily Hispanic schools did significantly better statistically in both reading and math than Chapter I students in conventional programs. There are also indications that articulation, thinking, social interaction, and general academic skills have increased. In one school, 10 percent of the Chapter I students were rediagnosed and placed as gifted after a year. In another, 36 percent of the Chapter I students made the honor roll. In all three schools where thinking skills were measured, HOTS students did significantly better than control students.[1] Because of these results, the U.S. Department of Education named HOTS an exemplary Chapter I program.

Through the efforts of many wonderful teachers and the support of the Ford Foundation, in three years the HOTS program has grown from the original 6 sites to 75 pilot projects around the country, with representation from urban inner-city to one-school rural districts. The program is now being expanded to learning disabled students in grades 4–6, to gifted students in grades K-2, and to Chapter I students in grades 3 and 7.

We have learned much from the success of HOTS about developing the thinking skills of at-risk students. Rather than focusing on the theoretical framework or specific techniques, this article will discuss conclusions about the conditions required for a thinking

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program to produce multiple, measurable benefits for at-risk students, no matter which thinking skills program is used. Many of these conclusions run contrary to popular beliefs and are difficult to prove, but they are based on extensive experience in working with at-risk students.[2] These conclusions do not necessarily apply to high-performing students.

1. *For at-risk students, thinking should not be integrated into the curriculum until one to two years after training in thinking begins.* Chapter I students lack experience in reflecting on ideas and constructing meanings and relationships; therefore, having to learn strange and difficult content by applying culturally strange thinking processes puts them in a double bind. As a result, thinking is not developed, and the content is not learned. While thinking in content is the ultimate goal, it should not be the initial means.

2. *Many at-risk students have not internalized a cultural sense of what understanding is, probably because parents and teachers seldom hold "understanding conversations" with them.* Many aspects of thinking are cultural, learned from the process of mastering an environment and from extensive interaction with adults. "Understanding conversations" refers to a process wherein an adult, parent, or teacher tries to get a student to examine the validity of expressed ideas given available information and to articulate why an initial idea is correct or incorrect based on the information.

Most of the students we deal with do not seem to know how to use ideas in school to develop understanding, to generalize, or even how to have conversations about issues other than turfdom. It is not that they do not have the ability; it is probably that understanding conversations have never been consistently modeled for them by adults, either at home or in school. (This problem is not limited to students from low SES homes.) Conversely, even if students engage in understanding conversations in the home, they might find few opportunities to apply those skills in the school context. Extended observations across a series of classrooms found hardly any examples of teachers engaging students in understanding conversations—even in small groups.

3. *The key to any successful thinking skills program is teachers who are trained to facilitate "understanding conversations."* The line between rote teaching and understanding conversations is thin. Subtleties in how teachers phrase questions and respond to students' answers can render the most sophisticated thinking skills curriculum and software into rote learning activities. Teachers must learn a whole new set of instincts to execute the model conversations contained in the HOTS curriculum.

The pedagogical techniques used in HOTS are based on three years of observing conversations between teachers and students and analyzing the conditions under which the think-

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ing aspects of conversations break down. These techniques spotlight (1) how teachers ask questions; (2) how they respond to student answers that are either logically correct and anticipated, logically correct and unanticipated, or logically incorrect; and (3) how they guide students at the computers.

Training for the HOTS program takes place over the course of a week. Teachers teach three lessons from the curriculum to their peers who act as students. The follow-up focuses on critiquing how they respond to the kids' answers. Teachers learn what their bad habits are and how to listen closely to the conversations between themselves and their students. It takes teachers almost a year to feel comfortable using these techniques with students. While the techniques are difficult at first, over time good teachers internalize them to the point that they become second nature.

4. *To help at-risk students understand "understanding," thinking activities must be intensive and consistent over a long period of time.* To ask a thinking question or do a thinking activity occasionally is of little value. It takes students two to three months of almost daily work on thinking activities before they start catching on to what understanding is; it is almost a year before they can habitually apply those thinking processes.

5. *General thinking skills do not have to be linked to classroom content in order to transfer to higher test scores.* While there are some linkages to the classroom curriculum, most HOTS activities are independent of classroom activities. However, the increased ability of Chapter I students to absorb and integrate classroom content when first taught produces substantial basic skills gains without supplemental drill—even on criterion-referenced tests. In Detroit, HOTS students did substantially better in both reading and math on criterion-referenced tests without linkages than control students who received supplemental drill linked to the test and curriculum.

6. *The only easily transferable skill is the ability to use language with sophistication.* Students who are able to use language with sophistication can learn content better. We have proof for this in the strong gains being produced in math without additional supplementary math activities. While many educators feel that students should be given separate help in reading and math by specialists, such an approach merely reinforces the students' tendency to view information as isolated facts. Gagne (1985) has noted that the cognitive underpinning of reading and math are the same. Both involve prediction, comprehension of text, and strategy development and testing. By developing these common skills through understanding conversations, students improve their performance in all content areas.[3]

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7. *You are better off having sophisticated understanding conversations about simple, easily recognizable concepts than simple conversations around sophisticated content or software.* For example, teaching students Shakespeare will not develop general thinking skills if relatively few understanding conversations take place. Similarly, sophisticated software that teaches thinking skills will be of little value by itself. It is better to use simple software that is not designed to develop thinking skills, but which facilitates sophisticated conversations between teachers and students.

8. *Rather than being "taught," thinking and understanding should evolve from context.* Curriculums that teach thinking can become simply more content presented and regurgitated in rote fashion. But, the understanding conversations developed around computers in HOTS help students realize the need for particular types of ideas and thinking processes based on experience, as opposed to having first been "taught" the need and then how to do it. The formalized learning in HOTS is usually conducted after this realization has occurred, rather than before.

For example, students are introduced to the importance of clues and their role. In the first few lessons students play a matching word game on the computer. As they attain mastery and begin to get high scores, the teacher surreptitiously changes the rule about how the words have to be matched. Suddenly students realize that their strategies aren't working. Initially, they complain that the computer is broken. When the teacher advises them that the computer is not broken and that the clues are on the screen, they quickly make the adjustment and begin to get high scores again. After this experience, the teacher tells them that rules change and that it is important to determine what the rules are at a given time. The same approach also works for developing reading comprehension. Simply put your students in a situation where they want to figure out how to use a piece of software, but don't tell them how to use it.

While some would argue that time is wasted letting this understanding evolve, this approach is far more meaningful to the student than when the teacher states: "Rules are important, and the next few days we are going to learn how to look for clues." I can hear the snores already.

9. *Thinking skills cannot be developed without a thinking environment.* Three components create a thinking environment. The first, which has already been discussed, is conducting understanding conversations with students.

The second is intriguing students to the point where they will exert intellectual energy. As such, workbooks and traditional forms of seatwork are not likely to stimulate the thinking ability of at-risk students. HOTS uses computers, team competition, and drama to stimulate students' curiosity about the problems presented.

The third is implementing "tough think" procedures, wherein teachers accept nothing less than thinking, and resist all student attempts to "con" them into simplifying or reducing the ambiguity. For example, teachers stare at the kids when they are not trying to think of answers or articulate their ideas. (We are not talking about three-second pauses, we are talking about heavy-duty staring. The record for our teachers is 30 minutes.) Once students realize the teacher is serious, the next time they see the teacher going into the staring routine, they immediately start to think. In addition, if students ask for help when clues to information are already available, they are told that they are smart enough to figure out what to do on their own.

When teachers apply these techniques consistently, students begin to respond. Once students accept the challenge of thinking for themselves and discover how much they enjoy it, inattention, discipline, and helplessness cease to be problems.

10. *The best way to develop the self-confidence of students is through controlled floundering.* Modern pedagogy seems to have shifted towards a belief that feeling good about oneself is the best way to enhance the learning of under-achievers. In essence, we

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treat kids as morons with fragile psyches when we feed them simple, dull material over and over again. The irony is that the techniques that have evolved to protect the students' self-concept prevent one from forming.

In reality, self-confidence evolves from success at a complex task that is viewed as valuable by the students and their peers. Given the complexity of tasks in the HOTS program, students often flounder the first day or two of a new unit. (However, the tasks are designed to keep the floundering to a short period of time.) While such floundering generates initial frustration, after the first few successes they realize that once they put their minds to a problem, they can figure out a good solution. The sense of accomplishment that comes from routinely mastering what at first seemed incomprehensible is a far more powerful learning experience than a teacher's telling them they are smart and giving them simple tasks.

11. *There is an optimal mix between thinking activities and rote learning activities.* Proponents of thinking skills argue that education should prepare students for the information age by focusing on thinking and problem solving. On the other side, advocates of basic education argue that rote learning is the only effective way to teach content. This debate leads to wild swings in educational practice.

Such extremism is misplaced from a learning development point of view. Rote learning is, in fact, the most efficient way to learn facts; and all good problem solvers must gather facts about problems they want to solve. However, rote learning does not transfer to improvements in problem solving. But the right amount of the right type of thinking activities actually enhances the learning of basic skills while it improves problem-solving ability.

Our research has not been conclusive on the optimal amount of time for each type of learning; but it is clear that providing thinking activities at least 35 minutes a day, four days a week, for about two years substantially improves ability to absorb content taught in conventional ways. It is time to stop the old arguments and start designing synergistic interventions that consciously integrate the strengths of each pedagogical approach.

12. *Given the sophisticated pedagogical skills needed to conduct understanding conversations, it is best to place the primary responsibility for developing thinking skills in the hands of a few outstanding teachers and train the rest of the staff to do the best possible job of presenting content.* Advocating that all teachers should teach thinking most of the time is unrealistic and unnecessary. Just as only a few doctors have the skills to be heart surgeons, only a minority of teachers have the skills needed to conduct sophisticated understanding conversations at the level necessary to produce transfer to multiple learning outcomes.

HOTS has demonstrated that one or two highly skilled teachers, intervening at key development points, can dramatically change how at-risk students feel about themselves and enhance their learning potential. However, since the extent to which students apply the thinking skills to the content of other classes depends partly on how well the other classes are taught, it is counterproductive to get the other teachers to focus on thinking activities prior to their achieving quality content instruction.

New Approaches Needed

Given the results from the recent national study by the Office of Educational Research and Improvement (OERI) that Chapter I has failed to narrow the gap between advantaged and disadvantaged students, and that gains are generally not retained, new approaches must be developed and tried, based on different theories of learning. If we merely apply existing techniques more efficiently, we may simply speed up the rate at which information flows out of the mind and is forgotten. The issue is not whether to have pullouts or in-class models, but how to develop and test new metaphors about how to stimulate learning.

Fortunately, there are many talented, energetic, and dedicated teachers out there who are looking for better ways to work with students. If we can figure out how to provide these teachers with better instructional frameworks and incentives, we will have taken a major step toward solving the dilemma of the at-risk student.□

1. All statistics are based on evaluations conducted by the schools mentioned in this article.

2. Individuals wishing additional information about the HOTS program and techniques can contact Stanley Pogrow at the University of Arizona, College of Education, Tucson, AZ 85721.

3. Some argue that developing the ability to be reflective about ideas and using language with sophistication is a very narrow definition of higher-order thinking. While the definition may be narrow as compared to programs that list hundreds of thinking skills, the skills developed in HOTS are not narrow; they are both the most fundamental and the broadest available to the human race.

Reference

Gagne, E. *The Cognitive Psychology of School Learning*. Boston: Little, Brown & Co.; 1985.

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