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Research into Practice

Raising the Achievement of All Students: Teaching for Successful Intelligence

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This article describes how we can teach students more effectively by teaching for successful intelligence. Teaching for successful intelligence involves instructing and assessing analytically, creatively, and practically, as well as for memory. Such teaching helps students recognize and capitalize on strengths, and at the same time recognize and correct or compensate for weaknesses. The article describes how to teach for successful intelligence and presents empirical evidence that teaching for successful intelligence really works in the classroom in raising student achievement.

KEY WORDS: achievement; analytical thinking; creative thinking; practical thinking; successful intelligence.

Our goal is to raise the achievement of all students. The question, of course, is how to do it. We think we have a way.

THE PROBLEM

The problem is that some children seem to benefit just fine from the schooling they get, but others do not. Teachers try very hard to reach all students, but rather frequently, find that there are some students who just seem hard to reach. There can be many reasons why certain students

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are hard to reach—disabilities, disorders, motivational problems, health problems, and so forth. One reason, though, can be the mismatch between a pattern of strengths and weaknesses on the part of the student and the particular range of methods that a teacher is using in trying to reach that student. "Teaching for successful intelligence" provides a series of techniques for reaching as many students as possible (Sternberg and Grigorenko, 2000; Sternberg and Spear-Swerling, 1996; Sternberg and Williams, 2002).

Teaching for successful intelligence is based on a psychological theory, the theory of successful intelligence (Sternberg, 1997). This theory is quite different from traditional theories of intelligence, which posit that intelligence is just a single construct, sometimes called *g*, or general intelligence, and sometimes known in terms of the IQ measure. The methods based on this new theory are not the only teaching methods based on a new psychological theory of intelligence. Gardner (1983, 1999) has proposed a different theory with somewhat different, although sometimes overlapping, methods of instruction. But I believe that our methods are particularly effective, and, moreover, have hard empirical data to support their usefulness.

The theory of successful intelligence holds that some students who do not do well in conventional courses may, infact, have the ability to succeed, if they are taught in a way that better fits their paterns of abilities. Permit me to give a concrete example. When I took my introductory psychology course, I was very motivated to become a psychologist. I received a grade of "C" in the course. The grade was extremely discouraging to me as was my instructor's comment that "There is a famous Sternberg in psychology, and judging from this grade, there won't be another one." I decided that I did not have the ability to major in psychology, and so I switched to mathematics. This was a fortunate decision for me, because on the midterm in advanced mathematics, I got a grade of "F." Now, the C was looking pretty good, and so I switched back to psychology. I received higher grades in subsequent courses, and today, I am a psychologist and was just recently elected President of the American Psychological Association, a national organization of about 155,000 psychologists.

The problem is that many children who might like to study a given subject area—whether language arts, mathematics, history, science, foreign language, or whatever—may give up because they believe they cannot succeed in studying it. They may either stop taking courses in the subject area, or just give up in the courses they are taking. Teaching for successful intelligence can give these students the chance to succeed that they might not otherwise have.

WHAT IS SUCCESSFUL INTELLIGENCE?[1]

Successful intelligence is the ability to succeed in life, given one's own goals, within one's environmental contexts. Thus, successful intelligence is a basis for school achievement but also life achievement.

One is successfully intelligent to the extent one effectively adapts to, shapes, and selects environments, as appropriate. Sometimes one modifies oneself to fit the environment (adaptation), as when a teacher or student enters a new school and tries to fit into the new environment. Other times, one modifies the environment to fit oneself, as when a teacher or student tries to improve the school environment to make it a better place in which to work. And yet other times, one selects a new environment, as when one decides that it would be better to be in another school because attempts to adapt to and/or shape the environment of the current shcool have not been successful.

People adapt, shape, and select by recognizing and capitalizing on strengths, and by recognizing and compensating for or correcting weakness. People do not achieve success in the same way. Each person has to find his or her own "recipe" for success. One of the most useful things a teacher can do is to help a student figure out how to make the most of what he or she does well and to find ways around what he or she does not do so well.

Finally, people capitalize and compensate through a balance of analytical, creative, and practical abilities. How to teach in a way that enables students to do so is the topic of the remainder of this article.

WHAT IS TEACHING FOR SUCCESSFUL INTELLIGENCE?

Teaching for successful intelligence involves a way of looking at the teaching–learning process that broadens the kinds of activities and assessment teachers traditionally do. Many good teachers "teach for successful intelligence" spontaneously. But, for one reason or another, most do not. Teaching for successful intelligence involves, at minimum, using a set of prompts that encourages students to engage in memory learning as well as analytical, creative, and practical learning.

The key ideas are as follows:

[1] In my earlier work (e.g., Sternberg, 1985), I proposed a "triarchic theory" of human intelligence. The present theory builds on the earlier one by defining intelligence in terms of people's ability to choose the personal and professional goals they set for their own lives.

Key 1: Teaching for Memory Learning

Most conventional teaching is teaching for memory learning. Teaching for successful intelligence does not ask teachers to stop what they already are doing. Rather, it asks teachers to build on it. Teaching for memory is the foundation for all other teaching because students cannot think critically (or any other way) about what they know if they do not know anything. Teaching for memory basically involves assisting or assessing students' memory of the *who* (e.g., "Who did something?"), *what* (e.g., "What did they do?"), *where* ("Where did they do it?"), *when* ("When did they do it?"), *why* ("Why did they do it?"), and *how* ("How did they do it?") of learning.

Here are some examples of teaching and assessing for memory learning:

- *Recall* a fact they have learned, such as the first President of the United States, or the product of 7×8, or the chemical formula for sodium.
- *Recognize* a fact they have learned, such as whether the first President of the United States was Washington, Adams, Jefferson, or Lincoln; or whether the product of 7×8 is 54, 56, 48, or 60; or whether the chemical formula for sodium is So, Na, Sd, or Nd.
- *Match* one set of items of one kind with another set of items of another kind, such as the list of presidents—Washington, Adams, Jefferson, Lincoln—with the list of numbers, 2, 1, 16, 3; or the elements hydrogen, sodium, oxygen, and potassium with the list of abbreviations, H, K, Na, and O.
- *Verify* statements, such as whether the statement "George Washington was the first President of the United States" or "The atomic number for uranium is 100" as true or false.
- *Repeat* what you have learned, such as a poem, an article of the Constitution, a scientific formula, or a mathematical formula.

Key 2: Teaching for Analytical Learning

Teachers who teach for successful intelligence do not only teach for memory because some students are not particularly adept as memory learners. I as I mentioned above, am a case in point. Many students have the ability to learn but fail miserably when they try to memorize or recall a set of isolated facts.

Here are examples of teaching and assessing for analytical learning and thinking:

- *Analyze* an issue, such as why Truman decided to bomb Hiroshima, or why certain elements are radioactive, or why children today still

find *Tom Sawyer* entertaining, or why a solution method for solving algebraic factoring problems works.
- *Evaluate* an issue, such as why unlimited political contributions can lead to corruption in a political system, how the Internet is vulnerable to catastrophic sabotage, what part of speech a certain word is, or how best to make a cake.
- *Explain* how the U.S. Electoral College works, or a wool blanket can produce static electricity, or how to solve an arithmetic word problem, or why a character in a short story acted the way she did.
- *Compare and contrast* two or more items, such as the systems of government in the United States and England, or igneous and sedimentary rocks, or two different ways of proving a geometric theorem, or two novels.
- *Judge* the value of characteristics of something, such as a law, or a scientific experiment, or a poem, or the metric system of measurement.

Key 3: Teaching for Creative Learning

Teaching for successful intelligence also involves encouraging students to use and develop their creative thinking skills. It recognizes that some students learn best when they are allowed to find their own ways to learn material and when they are left free to explore ideas that go beyond those likely to be in books or in lectures.

Here are some examples of teaching and assessing for creative learning and thinking:

- *Create* a game for learning the names of the states, or a poem, or a new numerical operation, or a scientific experiment.
- *Invent* a toy, or a new way of solving a difficult mathematics problem, or a new system of government that builds on old systems of government, or a haiku.
- *Explore* new ways of solving a mathematics problem beyond those taught by the teacher, or how to achieve a certain chemical reaction, or different ways of reading so as to improve your reading comprehension, or the nature of volcanoes.
- *Imagine* what it would be like to live in another country, or what will happen if temperatures on the Earth keep rising, or what Picasso might have been thinking when he painted *Guernica*, or what might happen if the United States switched to the metric system of measurement.
- *Suppose* that people were paid to inform on their neighbors to the political party in power—what would happen?, or that all lakes

instantly dried up—what would happen?, or that schools stopped teaching mathematics—what would happen?, or that Germany had won World War II—what would have happened?
- *Synthesize* your knowledge of the Vietnam War and the recent War in Afghanistan to propose a set of battle techniques that is likely to work in many unfamiliar kinds of terrains.

I believe that, to a large extent, creative thinking represents a decision to think and do things in certain ways. To teach students to think creatively, they need to learn to make these decisions (Sternberg, 2000). These decisions include, among other things, (a) redefining problems rather than merely accepting the way problems are presented, (b) being willing to take intellectual risks, (c) being willing to surmount obstacles when people criticize one's attempts at being creative, (d) being willing to work to persuade people of the value of one's creative ideas, and (e) believing that one truly has the potential to produce creative ideas in the first place.

Key 4: Teaching for Practical Learning

Some students are primarily practical learners. They do not catch on unless they see some kind of practical use for what they are learning.

Here are some examples of teaching and assessing for practical learning and thinking:

- *Put into practice* what you have learned about measurement in baking a cake; your foreign-language instruction in speaking with a foreigner; your knowledge of soils to determine whether a particular plant can grow adequately in a given soil.
- *Use* your knowledge of percentages or decimals in computing discounts; a lesson learned by a character in a novel in your own life; your knowledge of the effects of particulate matter in the atmosphere on vision to figure out whether a car driving behind you in the fog is substantially closer than it appears to be.
- *Use* a physical formula to figure out the speed at which an actual falling object will actually hit the ground; your understanding of cultural customs to figure out why someone from another cultures behaves in a way you consider strange; the lesson you learned from a fable or a proverb to change your actual behavior with other people.
- *Implement* a plan for holding a classroom election; a strategy for conserving energy in your home; what you have learned in a driver-education class in your actual driving; a psychological strategy for persuading people in raising money for charity.
- *Apply* your knowledge of political campaigns in history to running for class president; your knowledge of the principles of mixture

problems to mixing paints to achieve a certain color; your understanding of the principles of good speaking to giving a persuasive talk.

Part of teaching for practical thinking is teaching students to adopt certain attitudes in their intellectual work (Sternberg, 1986). These attitudes include ones such as (a) combating the tendency to procrastinate, (b) organizing oneself to get work done, (c) figuring out how one learns best, (d) avoiding the tendency to use self-pity as an excuse for working hard, and (e) avoiding blaming others for one's own failings.

SOME GENERAL PRINCIPLES

In teaching for successful intelligence, one is helping all students make the most of their skills by addressing all students at least some of the time. It is important to realize that teaching for successful intelligence does not mean teaching everything three times. Rather, one balances one's teaching strategies, so that one is teaching in each of the ways part of the time. An advantage of this procedure is that one does not have to know each student's exact strengths and weaknesses. By teaching in all of the ways, one is addressing some students' strengths at the same time one is addressing other students' weaknesses at each point. Balancing teaching strategies guarantees that one is addressing all students' strengths at least some of the time. But one does not want only to teach to strengths because students also need to learn how to compensate for and correct weaknesses.

COMPARISON TO OTHER THEORIES

No psychological theory or set of teaching techniques is completely new. Rather, theories and the teaching techniques that derive from them build on each other. It is thus useful to point out similarities and differences between teaching for successful intelligence and other ways of teaching, based on different theories.

One well-known theory is that of Bloom (1976; Bloom, Engelhart, Frost, Hill, & Krathwohl, 1956), known as Bloom's taxonomy. Bloom proposes a 6-level taxonomy: knowledge, comprehension, application, analysis, synthesis, and evaluation. Teaching for memory is related to teaching for knowledge and comprehension, teaching for analytical thinking to teaching for analysis and evaluation, teaching for creative thinking to teaching for synthesis, and teaching for practical thinking to teaching for application.

There are a few differences between the current theory and Bloom's. Here are four main ones.

First, the theory of successful intelligence does not view the three kinds of abilities as "hierarchically related." For example, one does not need to think for application (practically–lower in Bloom's hierarchy) in order to think for synthesis (creatively—higher in Bloom's hierarchy). On the contrary, much creative thinking is not necessarily practical at all (e.g., most academic scholarship), and much practical thinking is not necessarily creative (e.g., the thinking involved in filling out bureaucratic forms).

Second, the theory of successful intelligence parses skills differently. Analysis and evaluation are separated by synthesis in Bloom's theory, but in the theory of successful intelligence, they are seen as more related to each other than either is to synthetic thinking.

Third, the concepts of analytical, creative, and practical thinking are each somewhat broader than the terms of Bloom's taxonomy. As shown above, each of the three kinds of teaching includes, but is not limited to, the terms in Bloom's taxonomy. For example, synthesis is part of teaching for creative thinking, but only a small part of it.

Fourth, the techniques involved in teaching for successful intelligence derive from a theory of intelligence that has been tested in many different ways. Bloom's theory is not and was not intended to be a theory of intelligence.

Another related theory is that of Gardner (1983, 1993, 1999). Gardner's theory of multiple intelligences, like the theory of successful intelligence, attempts to extend our thinking about the nature of intelligence. Again, though, there are some key differences.

First, Gardner's theory deals with domains, positing linguistic intelligence, Iogical/mathematical intelligence, spatial intelligence, musical intelligence, naturalistic intelligence, bodily-kinesthetic intelligence, interpersonal intelligence, intrapersonal intelligence, and possibly existential intelligence. The theory of successful intelligence specifies classes of processes. Thus, at one level, the theories are largely complementary. One can teach analytically, creatively, or practically, for example, in the linguistic domain (analytical—analyze a poem, creative—write a short story, practical— write a persuasive essay), or in any other domain.

Second, Gardner includes as intelligences sets of skills that perhaps would not be viewed as intelligences in the theory of successful intelligence. For example, in order to survive in the world, everyone has to have at least some ability to think analytically, creatively, and practically. But it is not clear that, in order to survive in the world, everyone has to think musically.

Third, the theory of successful intelligence has been extensively validated predictively, meaning that, in scientific investigations, it has been shown to make certain predictions and not others, and that these

predictions have been largely upheld. I am unaware of any predictive tests of the theory of multiple intelligences. Although such tests may seem like an abstract detail to many teachers, validation of a theory helps ensure that it does, indeed, characterize how people really think, rather than merely the investigators' or others' opinions of how they really think.

Generally, then, there are similarities and difference between the theory of successful intelligence, on the one hand, and two others theories—those of Bloom and Gardner—on the other. Probably effective teachers will not totally "buy into" any one theory. Rather they will select those techniques from each theory that work most effectively for them in their teaching.

DOES TEACHING FOR SUCCESSFUL INTELLIGENCE WORK?

Teachers want—indeed, some demand—some level of assurance that, if they take the trouble to use a method of teaching, it really will work. We have done a series of studies showing that teaching for successful intelligence really does work. The common element of all these studies is the demonstration that when students are taught for successful intelligence, they are better able to capitalize on their strengths and to correct or compensate for their weaknesses, so that they learn at higher levels.

In a first study (Sternberg et al., 1999), for example, we identified high school children for their patterns of analytical, creative, and practical abilities. We then taught these children a rigorous psychology course that either fit their pattern of abilities particularly well or did not do so. For example, a highly creative child might receive an instructional program that emphasized creative learning and thinking (good fit) or one that emphasized memory learning (not so good fit). We found that children who were taught in a way that, at least some of the time, enabled them to capitalize on their strengths, outperformed students who were not so taught.

In a second study (Sternberg et al., 1998a,b), we taught third-grade students social studies and eighth-grade students science in one of three ways. We emphasized either just memory learning, or primarily analytical (critical) thinking, or teaching for successful intelligence (memory, analytical, creative, and practical learning). All students received the same quantity of instruction for the same time period, and all students received the same assessment for memory learning as well as for analytical, creative, and practical learning. We found that students who were taught for successful intelligence outperformed students who were taught for either memory or critical thinking, pretty much regardless of grade level, subject matter, or type of assessment.

In a third study (Grigorenko et al., 2002), we helped primarily inner-city urban students at the middle and high school levels develop their reading skills. At the middle-school level, reading was taught as a separate subject-matter area, whereas at the high school level, reading was infused into other subject-matter areas, such as English, science, foreign language, and history instruction. Students were taught either for successful intelligence or in a standard way that emphasized memory-based instruction. The students who were taught for successful intelligence outperformed the students taught in the more conventional way on all assessments, whether for vocabulary or reading comprehension, and whether emphasizing memory-based, analytical, creative, or practical thinking

CONCLUSION

Successful intelligence involves teaching students for memory, as well as analytically, creatively, and practically. It does not mean teaching everything in three ways. Rather, it means alternating teaching strategies so that teaching reaches (almost) every student at least some of the time. Teaching for successful intelligence also means helping students capitalize on their strengths and correct or compensate for their weaknesses. We believe we have good evidence to support teaching for successful intelligence. Teaching for successful intelligence improves learning outcomes, even if the only outcome measure is straightforward memory learning. We therefore encourage teachers seriously to consider use of this teaching method in their classrooms—at all grade levels and for all subject-matter areas.

Teaching for successful intelligence potentially provides benefits at multiple levels. It helps students to achieve at a level that is commensurate with their skills, rather than letting valuable skills, which could be used in facilitating learning, go to waste. It helps schools reach higher levels of achievement as a whole. And in these days of school accountability, reaching higher average scores is a goal virtually every school wants to reach. Finally, it helps society make better use of its human resources. There is no reason for a society to waste its most precious resource—its human talent. Teaching for successful intelligence helps ensure that talent will not go to waste.

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