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Retraction notice for "WICS: A new model for school psychology" by Robert J. Sternberg

At the request of the Journal Editor and SAGE Publishing, the following article has been retracted: Sternberg, R.J. (2010) WICS: A new model for school psychology. School Psychology International. 31(6): 599–616 DOI: 10.1177/0143034310386534

Although the content in the aforementioned article is scientifically valid, the article has substantial unreferenced overlap with the following works by the same author:

Sternberg, R.J. (2010) WICS: A new model for cognitive education. Journal of Cognitive Education and Psychology. 9(1): 36–47 DOI 10.1891/1945-8959.9.1.36

Sternberg, R.J. (2002) Individual differences in cognitive development. In Goswami, U. (Ed.), *Blackwell Handbook of Childhood Cognitive Development, 1* (pp. 600–620) DOI: 10.1002/9780470996652.ch27

Therefore, this article is retracted for reasons of redundant publication.

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RETRACTED: WICS: A new model for school psychology

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Abstract
This article presents a unified model for cognitive processing, WICS, which is an acronym for *w*isdom, *i*ntelligence, and *c*reativity, *s*ynthesized. The model can be applied to identification/admissions, diagnosis, instruction, and assessment. I discuss why there is a need for such a model. Then I describe traditional models, after which I describe the WICS model. The article attempts to show how the WICS model can be applied to admissions/identification as well as to instruction and assessment.

Keywords
creativity, intelligence, wisdom, admissions, identification, instruction

Many things have changed since 1854, but in some fundamental respects, education is not among them:

> Now, what I want is Facts. Teach these boys and girls nothing but facts. Facts alone are wanted in life… You can only form the minds of reasoning animals upon Facts… Stick to Facts, sir! (Dickens, 1854/2007).

These words made perfect sense to their originator, Thomas Gradgrind, an unimaginative school master, and to Mr McChoakumchild, the teacher with whom he worked, in Charles Dickens' 1854 novel *Hard Times for these Times;* but the whole of Dickens's novel was devoted to proving Gradgrind fatefully wrong. Even in the mid-19th century, literate people like Dickens recognized facts are not enough. It is depressing to discover in 2009 many of the same ideas were still coming from educational theorists (e.g. Ravitch, 2009).

The 'facts only' canard is based on the correct presupposition that 'one cannot think critically without quite a lot of knowledge to think about', as Ravitch puts it (p. A15). But the Gradgrinders then move on to setting up a straw man, which

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Ravitch does when she curiously notes that 'knowledge-free education has never worked'. This is true, but no one has ever advocated 'knowledge-free education' and no one ever will, because it is an oxymoron. Given that no school in the world teaches this way, it is not clear why some educators continue to bring it up, other than for rhetorical points. The maligned construct, 'critical thinking', is exactly what prevents us from creating such straw men.

The failure of the 'knowledge-only' approach is shown by people with encyclopedic knowledge bases whose main claim to fame is winning Trivial Pursuit or television quiz games. It is harmless when they win such games, but harmful when schools or educational theorists point to walking encyclopedias as exemplars of the best our education system can produce.

We have had many leaders in the United States (and elsewhere) who were educated at great places—Robert McNamara, architect of the Vietnam War, was a Berkeley and Harvard man; Donald Rumsfeld, initial architect of the Iraq War, was a Princeton man. George W. Bush, by the way, went to Yale and Harvard. Neville Chamberlain was educated at the famed Rugby School in the UK. Many of the architects of the financial disaster of 2008 were recruited from the best business schools in the United States. Richard Fuld, former chief executive officer (CEO) of the failed Lehman Brothers, did his MBA at NYU. Indeed, the firms that were largely behind the collapse of the financial markets in 2008 recruited only from the best schools, where students presumably learned lots of facts.

Certainly there is more to learning and teaching than memorization of facts. But what more? This article addresses that question.

Traditional psychometric models of intelligence

Psychometric theories are unique among the seven paradigms mentioned below in relying primarily upon individual differences both in their formulation and in their verification (or falsification). Psychometric researchers use techniques of data analysis to discover common patterns of individual differences across cognitive tests. These patterns are then hypothesized to emanate from latent sources of individual differences, namely, cognitive abilities.

The Galtonian Paradigm

The earliest psychometric theory of note was that of Galton (1883). Galton proposed the existence of two general qualities that he believed to distinguish the more from the less intellectually able. The two sources of individual difference are energy, or the capacity for labour, and sensitivity to physical stimuli. Galton devised psychophysical tests allegedly measuring these two sources of individual differences (primarily the second—sensitivity to physical stimuli). Examples of such tests were the ability to discriminate the weights of two objects and sensitivity to various pitches. Galton's beliefs were brought to the United States by J. M. Cattell

(1890), who proposed a series of psychophysical tests to measure individual differences in cognitive abilities.

The views of Galton and Cattell were dealt a blow by research done by Wissler (1901). This research suggested that the tests in Cattell's battery correlated neither with each other nor with college grades at Columbia University. But the Galtonian approach has never quite disappeared. Indeed, some cognitive research derives from work on individual differences in cognition done by Hunt, Frost, and Lunneborg (1973), which the authors viewed as deriving from the Galtonian tradition in the study of cognitive abilities. Others have followed up on this approach of studying individual differences in speed and efficiency of information processing (Deary, 2000; Jensen, 1998).

The Binetian Paradigm

Researchers in the tradition of Binet do not believe that complex cognitive processing can be reduced to the accretion and accumulation of simple processing. Alfred Binet and Theodore Simon, commissioned in 1904 by the Minister of Public Instruction in Paris to create a test that would insure that children with developmental disability would receive an adequate education, took a different tack from that of Galton. To these investigators, the core of individual differences in cognitive development is to be found in judgement, or good sense. Binet and Simon pointed out that Helen Keller would have done quite poorly on Galton's tests, yet was intelligent in any meaningful sense of the word.

Binet and Simon (1916) proposed a theory consisting of three distinct elements: direction, adaptation, and criticism. These elements, under other names (such as *metacognition*), today still are viewed as important to individual differences in cognition. Direction consists in knowing what has to be done and how it is to be accomplished. When children are required to add two numbers, for example, they give themselves a series of instructions on how to proceed and these instructions form the direction of thought. Adaptation refers to children's selection and monitoring of their strategy during the course of task performance. For example, in solving a mathematics problem, there may be several alternative strategies children can use (see, e.g. McNeil, Uttal, Jarvin, & Sternberg, 2009; Siegler, 1996; Siegler & Jenkins, 1989), and adaptation would be involved in deciding which strategy to select. Criticism or control is the ability to criticize one's own thoughts and actions. For example, after solving a mathematical word problem, a child might wish to evaluate the solution to make sure it is sensible.

The ideas of Binet and Simon were brought to the United States by a professor of psychology at Stanford University, L. M. Terman, who was involved in the construction of early versions of what has come to be called the Stanford-Binet Intelligence Test. The tasks on this test were very different from those used by Cattell in his tests. Examples of tasks would include verbal absurdities, which requires recognition of why each of a set of statements is foolish; similarities and differences, which requires children to say how each of two objects is

the same as, and different from, the other; comprehension, which requires children to solve practical problems of the sort encountered in everyday life; and naming the days of the week. The most recent version of this test is still widely used (Roid, 2006). The most widely used test for children is the Wechsler Intelligence Scale for Children, 4th edition (WISC-IV, Wechsler, 2003), an outgrowth of Binet but based upon a different framework for assessment. Wechsler, instead of just providing an overall IQ, provided separate verbal and performance scores as well as a total score.

The ideas of Binet are strongly linked to current notions about metacognition, that is, children's knowledge and control of their cognitive processing (e.g. Demetriou, Efklides, & Platsidou, 1993; Dunloski & Metcalfe, 2008; Flavell, 1992; Gopnik & Meltzoff, 1997; Goswami, 1996). In a sense, Binet was the first, or certainly one of the first, metacognitive theorists, recognizing the importance of children's understanding of their own behaviour for their cognitive development. Indeed, children with developmental disability, who have low IQs, are distinguished largely for their lack of adequate metacognitive functioning (Borkowski & Cavanaugh, 1979; Butterfield & Belmont, 1977; Campione, Brown, & Ferrara, 1982)

Factor theories

Galton, Binet, and Wechsler grounded their work in tests of intelligence. Other researchers used tests, but grounded their work in theories of intelligence. The researchers tested children with tests based on their theories and then analysed their data. One technique of data analysis they used is factor analysis, which analyses correlations or covariances among cognitive tests in order to produce a set of hypothetical underlying factors (abilities). Psychometric theories generally have been grounded in the factor as the basic unit of individual differences in cognitive abilities.

The earliest such theory was that of Spearman (1904, 1927), a theory that is still widely accepted today (see essays in Sternberg & Grigorenko, 2002). According to Spearman, underlying all individual differences in cognitive abilities is a general factor, or *g* factor, which Spearman believed to be due to differences in mental energy. This factor was alleged to permeate performance of all cognitive tests. Spearman also posited specific factors, or *s* factors, which were each specific to single tasks/abilities.

Not all theorists have accepted the idea of a single factor as responsible for most individual differences in cognition. Thurstone (1938) suggested that seven primary mental abilities underlie individual differences in cognition. The seven factors in Thurstone's theory are verbal comprehension, measured by vocabulary tests; number, measured by tests of computation and simple mathematical problem solving; memory, measured by tests of picture and word recall; perceptual speed, measured by tests that require the test-taker to recognize small differences in pictures or to cross out the *a's* in strings of letters; space, measured by tests

requiring mental rotation of pictures or other objects; verbal fluency, measured by speed with which one can think of words beginning with a certain letter; and inductive reasoning, measured by tests such as analogies and number-series completions.

In recent times, many psychometric theorists have settled on hierarchical models as useful characterizations of individual differences in cognitive abilities. These models combine the general factor of Spearman with the primary kinds of mental abilities of Thurstone by suggesting that the abilities are related hierarchically. One such model, developed by R. Cattell (1971), proposes that general intelligence—at the top of the hierarchy—comprises two major subfactors: fluid ability and crystallized. Fluid ability represents the acquisition of new information, or the grasping of new relations and abstractions regarding known information, as required in inductive reasoning tests such as analogies and series completions. Crystallized ability represents the accumulation of knowledge over the life span of the child and is measured, for example, in tests of vocabulary, of general information, and of achievement. Subsumed within these two major subfactors are other, more specific factors.

A more detailed hierarchical model, based on a reanalysis of many data sets from hundreds of studies, has been proposed by Carroll (1993). At the top of the hierarchy is general ability; in the middle of the hierarchy are various broad abilities, such as learning and memory processes and the effortless production of many ideas. At the bottom of the hierarchy are many narrow, specific abilities such as spelling ability and reasoning speed. Other similar hierarchical models have been proposed as well (e.g. Gustafsson, 1988; Horn, 1994; Vernon, 1971).

According to psychometric theorists, children differ from each other intellectually primarily by virtue of differences in their abilities as revealed by scores on the underlying factors of intelligence. Herrnstein and Murray (1994), among others (e.g. Jensen, 1998), have argued that children with low levels of *g*, or general intelligence are handicapped both in school and in life, and are less capable of succeeding in a wide variety of life activities, including school performance, getting along with others, and later in life, performance on the job. Many, although certainly not all psychometric theorists tend to emphasize the role that genes play in the development of intelligence, and tend to view levels of intelligence as relatively fixed rather than as modifiable (e.g. Bouchard, 1998).

The Wisdom-Intelligence-Creativity-Synthesized (WICS) model

The overall model proposed here is called WICS, which is an acronym for *w*isdom, *i*ntelligence, and *c*reativity *s*ynthesized. The model draws upon and is largely consistent with the ideas of John Dewey (1997). The basic idea is that citizens of the world need creativity to form a vision of where they want to go and to cope with change in the environment, analytical intelligence to ascertain whether their creative ideas are good ones, practical intelligence to implement their ideas and to

persuade others of the value of these ideas, and wisdom in order to ensure that the ideas will help achieve some ethically-based common good, over the long and short terms, rather than just what is good for them and their families or friends.

The WICS model differs from the traditional model, which emphasizes primarily memory and analytical skills. Traditional methods of teaching as well as conventional ability and achievement tests tend to emphasize stored knowledge of facts and basic skills in analysing this information (Sternberg, 1997). Such knowledge and skills are important. For example, one cannot think creatively to go beyond what is known if one does not have the knowledge to move forward. Similarly, one cannot apply what one knows if one knows nothing. But the problem is that stored knowledge can be inert and essentially unusable. Analytical skills can help one evaluate existing ideas but cannot help one come up with ideas of one's own. Nor can they help one adjust to a world that is changing rapidly and that leaves behind people who cannot flexibly adapt to its shifting demands.

The risk of the traditional system of instruction and assessment is that it creates self-fulfilling prophecies whereby those who do not test well are not given full opportunities in college to succeed (Sternberg, 1997). WICS is a framework that can help us get beyond self-fulfilling prophecies, in admissions, instruction, and assessment (Sternberg, 2003).

In the WICS model, analytical intelligence as exemplified in critical thinking *is* important, contrary to what Ravitch (2009) and other Gradgrinders have argued: It is what enables people to distinguish decent politicians from demagogues and healthful foods from widely advertised junk foods. Also important is creativity—the ability to respond flexibly to rapidly changing situations and world events—and practical intelligence—the ability actually to apply what you learn in school to real life. Creativity is needed to find ways to solve new problems, such as how to live on a greatly reduced income. Lack of such thinking leads people to get stuck in entrenched ideas that no longer work. Practical intelligence represents the difference between getting 100% on the written drivers' test and being able to drive, or the difference between knowing you should not drink and drive, and actually acting on this knowledge. Most important of all is wise and ethical thinking—putting what you learn to good use that helps build a better world rather than destroy it. Originally, for example, many thought that terrorists were poorly educated and ignorant. It then turned out that many of them are quite well educated. They lack not facts, but wisdom and positive ethics. Knowledge is necessary but not sufficient for critical, creative, practical, and wise thinking. If all schools do is 'stick to facts', they will poorly serve not only our children, but a world many of whose inhabitants are lacking not so much in knowledge as in how to employ it for good ends.

The skills people need to succeed in real-world careers do not always closely resemble the skills needed for success in elementary, secondary, and even tertiary schools. Life rarely presents multiple-choice or short-answer problems. It presents challenges to which the full WICS model is relevant. In our own work, we have applied the WICS model to admissions, instruction, and assessment

(see, e.g. Grigorenko et al., 2008; Sternberg, 2010; Sternberg, Grigorenko, & Zhang, 2008; Sternberg & the Rainbow Project Collaborators, 2006; Sternberg, Torff, & Grigorenko, 1998). In this article, I discuss how we have done so.

Identification and admissions through WICS

Is it possible that many students who are not now being identified as having impressive credentials for gifted programs, or for college or graduate work, might in fact be so identified if they were assessed in a way that looked at creative and practical, as well as analytical forms of skills? The Rainbow Project sought to answer this question with regard to university admissions at the undergraduate level (Sternberg, 2006; Sternberg & the Rainbow Project Collaborators, 2006). The project was a collaboration among 13 colleges and universities as well as two high schools. The project utilized the creativity and intelligence aspects of the WICS model. Because it was initiated prior to the development of WICS and was based on the earlier theory of successful intelligence (Sternberg, 1997), wisdom was not assessed.

The Rainbow measures supplement the SAT Reasoning Test, which is widely used in the United States for undergraduate admissions. The SAT Reasoning Test measures reading, mathematical, and writing skills. At the time we did this study, the writing component had not been added. A wide variety of studies have shown the utility of the SAT as a predictor of college success (e.g. Hezlett et al., 2001), especially as measured by GPA (grade-point average).

In the Rainbow Project, data were collected at 15 schools across the United States, including eight four-year colleges, five community colleges, and two high schools.

Participants were 1,013 students predominantly in their first year of college or their final year of high school. In this article, I discuss analyses only for college students, because they were the only ones for whom we had available college performance. The final number of participants included in these analyses was 793.

Baseline measures of standardized test scores and high-school grade-point average were collected to evaluate the predictive validity of current tools used for college admission criteria, and to provide a contrast for our current measures. All materials were administered either in paper-and-pencil format or on the computer via the World Wide Web.

The measures of analytical skills were provided by the SAT plus analytical items we invented. One assessment was figuring out meanings of neologisms (artificial words) from natural contexts. Students see a novel word embedded in a paragraph, and have to infer its meaning from the context. In others assessments, students completed series of numbers and figural matrices.

We measured creative skills by multiple-choice but also open-ended measures. One open-ended measure required writing two short stories with a selection from

among unusual titles, such as 'The Octopus's Sneakers;' another one required orally telling two stories based upon choices of picture collages; and a third required captioning cartoons from among various options.

Practical skills were measured by multiple-choice items but also performance-based measures called situational-judgement inventories. One assessment presented movies showing everyday situations that confront college students, such as asking for a letter of recommendation from a professor who shows, through nonverbal cues, that he does not recognize you very well, or figuring out what to do after eating a meal but not having the money to pay for it. A 'common sense questionnaire' provided everyday business problems, such as being assigned to work with a coworker whom one cannot stand, and a college life questionnaire provided everyday college situations for which a solution was required.

The Rainbow Assessments doubled prediction of freshman-year academic success over SAT scores alone. If SATs were combined with high school GPA, the Rainbow Assessments still increased prediction by 50%. In other words, the new assessments provided very substantial gains over traditional measures.

Although one important goal of the present study was to predict success in college, another important goal involved developing measures that reduce racial and ethnic group differences in mean levels. We found that our assessments reduced race and ethnicity differences relative to traditional assessments of abilities like the SAT. Although the group differences are not completely balanced out, these findings suggested that measures can be designed that reduce ethnic and racial group differences on standardized tests, particularly for historically disadvantaged groups like black and Latino students. These findings may have implications for reducing adverse impact in college admissions.

In 2005, I moved from Yale University, where I was IBM Professor of Psychology and Education and the lead collaborator in the Rainbow Project, to Tufts University, where I became Dean of the School of Arts and Sciences. Tufts University has strongly emphasized the role of active citizenship in education. So it seemed like an ideal setting to put into practice some of the ideas from the Rainbow Project. In collaboration with Dean of Admissions Lee Coffin, we instituted Project Kaleidoscope, which represents an implementation of the ideas of Rainbow, but goes beyond that project to include in its assessment the construct of wisdom (Sternberg 2007, 2009).

We placed on the application for all of the over 15,000 students applying each year to Arts, Sciences, and Engineering at Tufts, questions designed to assess WICS. The questions are optional. Whereas the Rainbow Project was done as a separate high-stakes test administered with a proctor, the Kaleidoscope Project was done as section of the Tufts-specific part of the university undergraduate application. It just was not practical to administer a separate high-stakes test such as the Rainbow Assessment for admission to one university (Tufts). Moreover, the advantage of Kaleidoscope is that it got us away from the high-stakes testing

situation in which students must answer complex questions in very short amounts of time under incredible pressure. As examples, a creative question asked students to write stories with titles such as 'The End of MTV' or 'Confessions of a Middle-School Bully'. Another creative question asked students what the world would be like if some historical event had come out differently, for example, if Rosa Parks had given up her seat on the bus. Yet another creative question, a nonverbal one, gave students an opportunity to design a new product or an advertisement for a new product. A practical question queried how students had persuaded friends of an unpopular idea they held. A wisdom question asked students how a passion they had could be applied toward a common good.

We found that Kaleidoscope scores correlate only minimally (.1 or less) with the SAT. At the same time, the kinds of ethnic differences encountered on the SAT and even the Rainbow assessments disappeared. Students who scored at high levels on the Kaleidoscope assessment have shown increased participation in extracurricular activities during their first year of college. They performed academically at levels comparable to students who excelled in ways other than through Kaleidoscope. If one controls for conventional academic assessments (SAT and high school GPA), Kaleidoscope significantly adds to prediction of first-year university GPA. Thus, the assessment provided a way of predicting leadership involvement, independently of ethnic group, and without any sacrifice in academic skills.

Such projects can be done at the graduate level as well. We designed an admissions test for a large and highly rated business school in the Midwest. We showed that we could increase prediction and decrease both sex and ethnic-group differences in admissions (Hedlund, Wilt, Nebel, Asfhord, Sternberg, 2006). These assessments can also be applied for measuring achievement as well as abilities (Stemler et al., 2006, 2009).

The assessment projects I describe above are for college students. However, we have applied similar techniques at other levels. One battery, Aurora, is used for identification of gifted children of roughly ages 10–12 (Chart et al., 2008). It assesses analytical, creative, and practical skills in the verbal, quantitative, and figural domains. It also contains a teacher and parent assessment of the children. Another battery that we devised for admissions purposes at a private school in the United States, Choate Rosemary Hall, can be used for selection of students for private secondary-school admissions. So the general ideas described here can be applied at any level of education from the primary grades upward.

One might wonder how one assesses answers to questions that seem so subjective. The assessment is through well-developed rubrics. For example, we assess analytical responses on the basis of the extent to which they are (a) analytically sound, (b) balanced, (c) logical, and (d) organized. We assess creative responses on the basis of how (a) original and (b) compelling they are, as well as on the basis of their (c) appropriateness to the task with which the students were presented. We assess practical responses on the basis of how feasible they are with respect

to (a) time, (b) place, (c) human (d) material resources, and (e) how persuasive they are. We assess wisdom-based responses on the extent to which they (a) promote a common good by (b) balancing one's own with others' with larger interests, (c) over the long and short terms, through (d) the infusion of positive (prosocial) ethical values.

Teaching and assessing for WICS

Can we teach for WICS—the kinds of skills and attitudes that really matters in life and in jobs? There are many techniques that can be used to teach for WICS (Sternberg & Grigorenko 2007; Sternberg, Jarvin, & Grigorenko 2009). These techniques can be used in any subject-matter area and at any level.

Teaching analytically means encouraging students to: (a) analyse; (b) critique; (c) judge; (d) compare and contrast; (e) evaluate; and (f) assess. When teachers refer to teaching for 'critical thinking', they typically mean teaching for analytical thinking. How does such teaching translate into instructional and assessment activities? Consider various examples across the school curriculum:

a. analyse the development of the character of Heathcliff in *Wuthering Heights* [literature];
b. critique the design of the experiment (just gone over in class or in a reading) showing that certain plants grew better in dim light than in bright sunlight [biology];
c. judge the artistic merits of Roy Lichtenstein's 'comic-book art', discussing its strengths as well as its weaknesses as fine art [art];
d. compare and contrast the respective natures of the American Revolution and the French Revolution, pointing out ways both in which they were similar and those in which they were different [history];
e. evaluate the validity of the following solution to a mathematical problem, and discuss weaknesses in the solution, if there are any [mathematics];
f. assess the strategy used by the winning player in the tennis match you just observed, stating what techniques she used in order to defeat her opponent [physical education].

Teaching creatively means encouraging students to: (a) create; (b) invent; (c) discover; (d) imagine if . . .; (e) suppose that . . .; and (f) predict. Teaching for creativity requires teachers not only to support and encourage creativity, but also to role-model it and to reward it when it is displayed (Sternberg & Lubart, 1995; Sternberg & Williams, 1996). In other words, teachers need not only to talk the

talk, but also to walk the walk. Consider some examples of instructional or assessment activities that encourage students to think creatively:

a. create an alternative ending to the short story you just read that represents a different way things might have gone for the main characters in the story [literature];
b. invent a dialogue between an American tourist in Paris and a Frenchman he encounters on the street from whom he is asking directions on how to get to the Rue Pigalle [French];
c. discover the fundamental physical principle that underlies all of the following problems, each of which differs from the others in the 'surface structure' of the problem but not in its 'deep structure . . .' [physics];
d. imagine if the government of China keeps evolving over the course of the next 20 years in much the same way it has been evolving. What do you believe the government of China will be like in 20 years? [government/political science];
e. suppose that you were to design one additional instrument to be played in a symphony orchestra for future compositions. What might that instrument be like, and why? [music];
f. predict changes that are likely to occur in the vocabulary or grammar of spoken Spanish in the border areas of the Rio Grande over the next 100 years as a result of continuous interactions between Spanish and English speakers [linguistics].

Teaching practically means encouraging students to: (a) apply; (b) use; (c) put into practice; (d) implement; (e) employ; and (f) render practical what they know. Such teaching must relate to the real practical needs of the students, not just to what would be practical for individuals other than the students (Sternberg et al., 2000). Consider some examples:

a. apply the formula for computing compound interest to a problem people are likely to face when planning for retirement [economics, mathematics];
b. use your knowledge of German to greet a new acquaintance in Berlin [German];
c. put into practice what you have learned from teamwork in football to making a classroom team project succeed [physical education];
d. implement a business plan you have written in a simulated business environment [business];
e. employ the formula for distance, rate, and time, to compute a distance [mathematics];
f. render practical a proposed design for a new building that will not work in the aesthetic context of the surrounding buildings, all of which are at least 100 years old [architecture].

Teaching for wisdom means encouraging students to: (a) try to find a common good; (b) see things from others' points of view as well as your own; (c) balance your own interests with those of others and of institutions; (d) look at the long term as well as the short term; (e) ask how you can infuse positive ethical values into your decision making; and (f) realize that in real life, what is effective and often even true or perceived to be true varies over time and place (Sternberg, 2001). Examples would be:

a. what might be a just solution for the common good in the Israeli-Palestinian conflict? [political science]?;
b. did Native Americans view settlers who came West as settlers or as invaders, and why? [history];
c. should Wall Street traders get bonuses if they have lost money for their clients? [economics];
d. how is global warming going to effect life on Earth in the long-term? [geology, climatology];
e. is it ever ethical to bomb enemy territories where civilians live? [philosophy];
f. how does what works in an intimate relationship change over time? [psychology].

Smart but foolish people are susceptible to one or more of six fallacies (Sternberg, 2005):

a. unrealistic optimism: They believe they are so smart that whatever they do will work out just fine, regardless of whether it really makes sense;
b. egocentrism: They start to view decisions only in terms of how the decisions benefit them;
c. omniscience: They think they are all-knowing; they don't know what they don't know;
d. omnipotence: They think they can do whatever they want;
e. invulnerability: They think they are so smart they can get away with anything they do;
f. ethical disengagement: They believe that ethical behaviour is important for others but not for themselves.

Our view that we might have success in teaching in these ways dates back at least to a study in which my collaborators and I gave a test that we had devised to over 300 high school students across the United States in order to select students on the basis of analytical, creative, and practical abilities (Sternberg, Grigorenko, Ferrari, & Clinkenbeard, 1999). The identification was prior to their being placed into sections to take a college-level summer psychology course. When we divided the students into such groups, we noticed something that, at the time, was unexpected. Students in the high-analytical group, who excelled in the abilities measured by conventional tests, were for the most part white and middle-class. Many had been

previously identified as gifted for other programs. Students in the high creative and high practical group were ethnically diverse and many had never before been identified as gifted.

The question, of course, is whether those identified as strong in the alternative ways (i.e. creatively or practically) actually performed at high levels. The answer was clear. When students were taught in a way that matched their patterns of abilities, at least some of the time, they excelled. In other words, the creatively and practically oriented students did excel, so long as the way they were taught matched, at least some of the time, the way they learned. Good teachers use a variety of teaching methods to reach diverse learning styles of their students, so any student taught in a way that is responsive to his or her pattern of abilities can excel.

What effects does teaching for WICS have on achievement? After this study, my colleagues and I went on to show that teaching to diverse styles of learning—memory, analytical, creative, practical, wisdom-based—does indeed improve achievement relative to teaching that emphasizes just traditional memory-analytical patterns of learning and thinking (Grigorenko, Jarvin, & Sternberg 2002; Sternberg, Grigorenko, & Zhang, 2008; Sternberg, Torff, & Grigorenko 1998).

I taught for WICS in a course in the Psychology Department at Tufts University. The idea is that if we select students for WICS, we should teach according to WICS as well so that how students are taught matches how they are selected. The course is open to undergraduates at all levels in all fields of specialization, and has no prerequisites. The course, on leadership, involves a textbook on theories and research on leadership, but also a book of case studies of leadership, and two books by leadership theorists on their own views on leadership. Considered as well are four additional features of the course.

First, in every class except the first and the last, a leader comes and speaks to students for about 15 minutes on his or her leadership experiences. The leaders come from all domains of life, including politics, finance, management, the arts, sports, religion, and the like. An additional 45 minutes is then spent in the class asking questions of and having a discussion with the leader. Students' interactions with the leaders give them a chance to develop and also to challenge their own beliefs about leadership.

Second, every class except the last involves an active-leadership exercise. For example, in the first class, a shill joined the students and pretended to be one of them. After I went through the syllabus, the shill challenged it and complained that it was inadequate in a variety of ways. Students were amazed at the shill's audacity. When he was done with his complaints, I thanked him, and then noted to the class that every leader, sooner or later, confronts public challenges to his or her authority. The question is not whether it will or will not happen—it will—but rather, how the leader handles such challenges. Students divided themselves into three groups and then simulated how they would handle public challenges. In another class, students had to 'hire a dean'. They divided themselves into three groups. One simulated the formation of a vision statement, the second simulated a job

interview, and the third simulated a persuasion interview to entice the selected candidate to come. In yet another class, students simulated how they would deal with an incompetent team member, and in another, each of three groups formulated a proposal to improve the university; they then had to persuade the class, acting as funders, to fund their project.

Third, students had to do both individual and group projects. The individual projects involved their applying leadership concepts to their own leadership and the leadership of others, whom they interviewed. The group project involved their applying principles from the course to analysing the leadership of a major known leader. Some of their choices were Bill Clinton, former president of the United States; Bill Gates, former CEO of Microsoft; and Kenneth Lay, former CEO of the now-defunct and failed energy company, Enron.

Fourth, exams emphasized using what one had learned. The final examination, for example, involved the story of a leader from the time she first took a leadership job until the time she was considering leaving it. The students had to analyse her leadership performance at every step along the way.

In sum, teaching for WICS seems to improve school achievement at a variety of levels and in a variety of subject-matter areas.

Conclusion

WICS is, of course, not the only model that can be applied to identification/admissions, instruction, and assessment. Gardner (1983, 1993, 1999) has presented a well-known model of multiple intelligences that is appealing, although perhaps in need of rigorous empirical test. Feuerstein (1979, 1980) has presented a model of cognitive modifiability through mediated learning experience that also can be applied in schools. In earlier times, many scholars found the model of Guilford (1982) attractive, although its empirical foundations have proved questionable because of the use of Procrustean rotations of factorial axes. Baltes (1997) presented a model of intellectual selection, optimization, and compensation that also could be adapted for school use, and has been used in cognitive training for the elderly (e.g. Schaie & Willis, 1986). Anderson's (1983, 1991, 1993) model of adaptive control of human thought (ACT) also presents possibilities for use in school psychology.

WICS thus provides one among a number of unified models for identification and admissions, diagnosis, instruction, and assessment. The WICS model can be used at any level and for any subject matter. An advantage of the model is that it goes beyond more traditional models emphasizing memory and analytical learning, and as a result, enables all students to capitalize on strengths and compensate for or correct weaknesses. It further reduces ethnic and other differences in performance commonly found in traditional assessments. It thus provides a basis for school psychology that represents the realities of the 21st century rather than those of a bygone era.

References

Anderson, J. R. (1983). *The architecture of cognition*. Cambridge, MA: Harvard University Press.

Anderson, J. R. (1991). The adaptive nature of human categorization. *Psychological Review*, *98*, 409–429.

Anderson, J. R. (1993). *Rules of the mind*. Hillsdale, NJ: Erlbaum.

Baltes, P. B. (1997). On the incomplete architecture of human ontogeny: Selection, optimization, and compensation as foundations of developmental theory. *American Psychologist*, *52*, 366–380.

Binet, A., & Simon, T. (1916). *The development of intelligence in children*. Baltimore, MD: Williams & Wilkins. (Originally published in 1905).

Borkowski, J. G., & Cavanaugh, J. C. (1979). Maintenance and generalization of skills and strategies by the retarded. In N. R. Ellis (Ed.), *Handbook of mental deficiency: psychological theory, and research* (2nd edn., pp. 569–617). Hillsdale, NJ: Erlbaum.

Bouchard, T. J. (1998). Genetic and environmental influences on adult intelligence and special mental abilities. *Human Biology*, *70*, 257–279.

Butterfield, E. C., & Belmont, J. M. (1977). Assessing and improving the cognitive functions of mentally retarded people. In I. Bialer & M. Sternlicht (Eds.), *The psychology of developmental disability: Issues and approaches*. New York, NY: Psychological Dimensions.

Campione, J. C., Brown, A. L., & Ferrara, R. (1982). Developmental disability and intelligence. In R. J. Sternberg (Ed.), *Handbook of human intelligence* (pp. 392–490). New York, NY: Cambridge University Press.

Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytic studies*. New York, NY: Cambridge University Press.

Cattell, R. B. (1971). *Abilities: Their structure, growth and action*. Boston, MA: Houghton Mifflin.

Cattell, J. M. (1890). Mental tests and measurements. *Mind*, *15*, 373–380.

Chart, H., Grigorenko, E. L., & Sternberg, R. J. (2008). Identification: The Aurora Battery. In J. A. Plucker & C. M. Callahan (Eds.), *Critical issues and practices in gifted education* (pp. 281–301). Waco, TX: Prufrock.

Deary, I. J. (2000). Simple information processing and intelligence. In R. J. Sternberg (Ed.), *Handbook of intelligence* (pp. 267–284). New York, NY: Cambridge University Press.

Demetriou, A., Efklides, A., & Platsidou, M. (1993). The architecture and dynamics of developing mind. *Monographs of the Society for Research in Child Development*, *58*(5–6), Serial No. 234.

Dewey, J. (1997). *Experience and education*. New York, NY: Free Press.

Dickens, C. (1854/2007). *Hard times for these times*. New York, NY: Simon & Schuster.

Dunloski, J., & Metcalfe, J. (2008). *Metacognition: A textbook for cognitive, educational, life span and applied psychology*. Thousand Oaks, CA: Sage.

Feuerstein, R. (1979). *The dynamic assessment of retarded performers: The learning potential assessment device, theory, instruments, and techniques*. Baltimore, MD: University Park Press.

Feuerstein, R. (1980). *Instrumental enrichment: An intervention program for cognitive modifiability*. Baltimore, MD: University Park Press.

Flavell, J. H. (1992). Cognitive development: Past, present, and future. *Developmental Psychology*, *28*, 998–1005.

Galton, F. (1883). *Inquiry into human faculty and its development*. London: Macmillan.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York, NY: Basic Books.

Gardner, H. (1993). *Multiple intelligences: The theory in practice*. New York, NY: Basic Books.

Gardner, H. (1999). Are there additional intelligences? The case for naturalist, spiritual, and existential intelligences. In J. Kane (Ed.), *Education, information, and transformation* (pp. 111–131). Upper Saddle River, NJ: Prentice-Hall.

Gopnik, A., & Meltzoff, A. (1997). *Words, thoughts, and theories*. Cambridge: MA: MIT Press.

Goswami, U. (1996). Analogical reasoning and cognitive development. In H. Reese (Ed.), *Advances in child development and behavior* (Vol. 26). San Diego, CA: Academic Press.

Grigorenko, E. L., Jarvin, L., & Sternberg, R. J. (2002). School-based tests of the triarchic theory of intelligence: Three settings, three samples, three syllabi. *Contemporary Educational Psychology*, *27*, 167–208.

Grigorenko, E. L., Jarvin, L., Tan, M., & Sternberg, R. J. (2008). Something new in the garden: assessing creativity in academic domains. *Psychology Science Quarterly*, *50*, 295–307.

Guilford, J. P. (1982). Cognitive psychology's ambiguities: Some suggested remedies. *Psychological Review*, *89*, 48–59.

Gustafsson, J. E. (1988). Hierarchical models of the structure of cognitive abilities. In R. J. Sternberg (Ed.), *Advances in the psychology of human intelligence* (Vol. 4, pp. 35–71). Hillsdale, NJ: Erlbaum.

Hedlund, J., Wilt, J. M., Nebel, K. R., Ashford, S. J., & Sternberg, R. J. (2006). Assessing practical intelligence in business school admissions: A supplement to the graduate management admissions test. *Learning and Individual Differences*, *16*, 101–127.

Herrnstein, R. J., & Murray, C. (1994). *The bell curve*. New York, NY: Free Press.

Hezlett, S., Kuncel, N., Vey, A., Ones, D., Campbell, J., & Camara, W. J. (2001). *The effectiveness of the SAT in predicting success early and late in college: A comprehensive meta-analysis*. Paper presented at the Annual Meeting of the National Council of Measurement in Education, Seattle, WA.

Horn, J. L. (1994). Theory of fluid and crystallized intelligence. In R. J. Sternberg (Ed.), *The encyclopedia of human intelligence* (Vol. 1, pp. 443–451). New York, NY: Macmillan.

Hunt, E. G., Frost, N., & Lunneborg, C. (1973). Individual differences in intelligence: A new approach to cognition. In G. H. Bower (Ed.), *The psychology of learning and motivation* (Vol. 87, pp. 87–122). New York, NY: Academic Press.

Jensen, A. R. (1998). *The g factor: The science of mental ability*. Westport, CT: Praeger/Greenwood.

McNeil, N. M., Uttal, D. H., Jarvin, L., & Sternberg, R. J. (2009). Should you show me the money? Concrete objects both hurt and help performance on mathematics problems. *Learning and Instruction*, *19*, 171–184.

Ravitch, D. (2009, September 15). Critical thinking? You need knowledge. *Boston Globe*, *276*(177), A15.

Roid, G. H. (2006). *Stanford-Binet intelligence scales* (5th edn.), Rolling Meadows, IL: Riverside.

Schaie, K. W., & Willis, S. L. (1986). Can decline in intellectual functioning in the elderly be reversed? *Developmental Psychology*, *22*, 223–232.

Siegler, R. S. (1996). *Emerging minds: The process of change in children's thinking*. New York, NY: Oxford University Press.

Siegler, R., & Jenkins, E. A. (1989). *How children discover new strategies*. Hillsdale, NJ: Erlbaum.
Spearman, C. (1904). 'General intelligence', objectively determined and measured. *American Journal of Psychology*, *15*, 201–293.
Spearman, C. (1927). *The abilities of man*. London: Macmillan.
Stemler, S. E., Grigorenko, E. L., Jarvin, L., & Sternberg, R. J. (2006). Using the theory of successful intelligence as a basis for augmenting AP exams in psychology and statistics. *Contemporary Educational Psychology*, *31*(2), 344–376.
Stemler, S., Sternberg, R. J., Grigorenko, E. L., Jarvin, L., & Sharpes, D. K. (2009). Using the theory of successful intelligence as a framework for developing assessments in AP Physics. *Contemporary Educational Psychology*, *34*, 195–209.
Sternberg, R. J. (1997). *Successful intelligence*. New York, NY: Plume.
Sternberg, R. J. (2001). Why schools should teach for wisdom: The balance theory of wisdom in educational settings. *Educational Psychologist*, *36*, 227–245.
Sternberg, R. J. (2003). *Wisdom, intelligence, and creativity synthesized*. New York, NY: Cambridge University Press.
Sternberg, R. J. (2005). Foolishness. In R. J. Sternberg & J. Jordan (Eds.), *Handbook of wisdom: Psychological perspectives* (pp. 331–352). New York, NY: Cambridge University Press.
Sternberg, R. J. (2006). How can we simultaneously enhance both academic excellence and diversity? *College and University*, *81*, 17–23.
Sternberg, R. J. (2007). Finding students who are wise, practical, and creative. *The Chronicle of Higher Education*, *53*(44), B11.
Sternberg, R. J. (2009). The Rainbow and Kaleidoscope projects: A new psychological approach to undergraduate admissions. *European Psychologist*, *14*, 279–287.
Sternberg, R. J., Forsythe, G. B., Hedlund, J., Horvath, J., Snook, S., Williams, W. M., Wagner, R. K., & Grigorenko, E. L. (2000). *Practical intelligence in everyday life*. New York, NY: Cambridge University Press.
Sternberg, R. J. & Grigorenko, E. L. (Eds.) (2002). *The general factor of intelligence: How general is it?* Mahwah, NJ: Lawrence Erlbaum Associates.
Sternberg, R. J., & Grigorenko, E. L. (2007). *Teaching for successful intelligence* (2nd edn.), Thousand Oaks, CA: Corwin Press.
Sternberg, R. J., Grigorenko, E. L., Ferrari, M., & Clinkenbeard, P. (1999). A triarchic analysis of an aptitude-treatment interaction. *European Journal of Psychological Assessment*, *15*, 1–11.
Sternberg, R. J., Grigorenko, E. L., & Zhang, L. -F. (2008). Styles of learning and thinking matter in instruction and assessment. *Perspectives on Psychological Science*, *3*, 486–506.
Sternberg, R. J., Jarvin, L., & Grigorenko, E. L. (2009). Teaching for wisdom, intelligence, creativity, and success. Thousand Oaks, CA: Corwin.
Sternberg, R. J., & Lubart, T. I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity*. New York, NY: Free Press.
Sternberg, R. J., & The Rainbow Project Collaborators. (2006). The Rainbow Project: Enhancing the SAT through assessments of analytical, practical and creative skills. *Intelligence*, *34*, 321–350.
Sternberg, R. J. (2010). *College admissions for the 21st century*. Cambridge, MA: Harvard University Press.
Sternberg, R. J., Torff, B., & Grigorenko, E. L. (1998). Teaching triarchically improves school achievement. *Journal of Educational Psychology*, *90*, 374–384.

Sternberg, R. J., & Williams, W. M. (1996). *How to develop student creativity*. Alexandria, VA: Association for Supervision and Curriculum Development.
Thurstone, L. L. (1938). *Primary mental abilities*. Chicago, IL: University of Chicago Press.
Vernon, P. E. (1971). *The structure of human abilities*. London: Methuen.
Wechsler, D. (2003). *Manual for the Wechsler Intelligence Scales for Children* (4th edn.), (WISC-IV). San Antonio, TX: Harcourt Assessment.
Wissler, C. (1901). The correlation of mental and physical tests. *Psychological Review, Monograph Supplement*, *3*(6).

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