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Academic Intelligence is not Enough!

WICS: An Expanded Model for Effective Practice in School and in Later Life

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What are the qualities a student needs to develop in order to become an active, reflective, and involved citizen and professional who achieves success in his or her life endeavors? How do these qualities go beyond the ones that we typically foster and evaluate among students in liberal arts courses in colleges and universities? If there is a discrepancy, is it possible that we in the academy are, at some level, mis-preparing students for the world in which they will find themselves? And if so, are there elements we can add to a liberal-arts education that will more fully address the qualities our graduates will need for successful engagement in the world? These are the central questions I seek to address in this essay.

THE WICS MODEL

I propose the WICS model as a possible common basis for the development of skills and attitudes in college (Sternberg, 2003, 2005, 2008b). WICS is an acronym standing for wisdom, intelligence, and creativity, synthesized. Wisdom, intelligence, and creativity, I will argue, are sine qua nons for the citizens and professionals of the future, and really, for anyone who wishes to achieve meaningful success in his or her life.

It is important to state at the outset that all of these qualities are modifiable and dynamic. One is not born with a fixed level of wisdom, intelligence, or creativity, but rather develops these attributes over time. They are forms of developing expertise (Sternberg, 1998a). All of us, of course, are born with some genetic predispositions. But during the course of a lifetime, these predispositions are modified by our experience such that they are developed at different rates and with different levels of success as a function of the interaction between genes and environment (Sternberg & Grigorenko, 1999).

In the remainder of this essay, I discuss each of these attributes, although for didactic purposes, I do not discuss them in the order they are stated above. I start with intelligence, which is a basis for creativity and wisdom and so should be discussed first. Within this discussion, I deal first with the analytic/academic aspect of intelligence, and then the practical one. Next I discuss creativity. Finally, I discuss wisdom, which builds on but goes beyond intelligence and creativity. I then describe methods for developing and measuring the attributes. Finally, I draw some general conclusions.

Intelligence

Introduction

There are many definitions of intelligence, although intelligence is typically defined in terms of a person's ability to adapt to the environment and to learn from experience (Sternberg & Detterman, 1986). Charles Spearman (1904) first proposed that intelligence comprises a single general ability (*g*), as well as more specific abilities. This view has been extended by Carroll (1993), who is one of a number of theorists who have proposed hierarchical models, with general ability at the top and successively more specific abilities at lower levels. Such models might, for example, distinguish among verbal-comprehension ability, mathematical ability, spatial ability, and so forth.

Howard Gardner (1983, 1993b, 1999) does not view intelligence as a single construct. However, instead of speaking of multiple abilities that together constitute intelligence, like some other theorists, Gardner proposed a theory of multiple intelligences, in which eight distinct intelligences function somewhat independently of one another: linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, intrapersonal, and naturalist. Gardner (1999) also has speculated on the possible existence of existential and even spiritual intelligences. Each intelligence is a separate system of functioning. Nevertheless, these systems can interact to produce intelligent performance. For example, novelists rely heavily on linguistic intelligence but might use logical-mathematical intelligence in plotting story lines or checking for logical inconsistencies. Measuring intelligences separately might produce a profile of skills that is broader than would be obtained from, say, measuring verbal and mathematical abilities alone. This profile could then be used to facilitate educational and career decisions. Teaching to

these various intelligences would require a teacher to integrate a broad range of teaching methods, such as teaching about the history of the United States through words (linguistic), maps (spatial), and songs (musical).

In order to identify particular intelligences, Gardner used converging operations, gathering evidence from multiple sources and types of data. The base of evidence includes (but is not limited to) the distinctive effects of localized brain damage on specific kinds of intelligences, distinctive patterns of development in each kind of intelligence across the life span, evidence from exceptional individuals (from both ends of the spectrum), and evolutionary history.

Gardner's view of the mind is *modular*. Modularity theorists believe that different abilities can be isolated as emanating from distinct portions or modules of the brain. Thus, a major task of existing and future research on intelligence is to isolate the portions of the brain responsible for each of the intelligences. Gardner has speculated as to at least some of these relevant portions, but hard evidence for the existence of separate intelligences has yet to be produced.

Theory of Successful Intelligence

What is Successful Intelligence?

This essay draws upon my theory of successful intelligence. According to this theory (Sternberg, 1997, 1999), successful intelligence is the ability to achieve one's goals in life, given one's sociocultural context; by capitalizing on strengths and correcting or compensating for weaknesses; in order to adapt to, shape, and select environments; through a combination of analytical, creative, and practical abilities.

Consider each of the three kinds of abilities in turn. Analytical ability involves analyzing, evaluating, judging, inferring, critiquing, and comparing and contrasting. Creative ability involves creating, designing, inventing, imagining, supposing, and exploring. Practical ability involves applying, using, implementing, contextualizing, and putting into practice. The three sets of cognitive skills are somewhat different, and often are found in different people in different degrees. Consider three students (who are genuine but whose names have been changed) who motivated the theory

Alice was the teacher's dream. Her analytical skills were superb. She scored high on tests, performed well in class, and, in general, did everything a teacher would expect a bright student to do. As a result, Alice was initially considered in her university studies to be at or near the top of the class. Her stellar test scores were accepted as a valid indicator of her ability to do outstanding work throughout her academic career. Yet by the time she had finished her studies, she was performing at a very modest level. About 80% of her classmates were doing better than she was. What went wrong? The answer, quite simply, is that whereas Alice was excellent at remembering and analyzing other people's ideas, she was not very good at coming up with ideas of her own. Consequently, she faltered in advanced schooling, where it is necessary (as it is in much of life) to have original ideas and not just to remember or analyze what one's teacher has told one.

As an adult, Alice will face challenges if she does not develop higher levels of creative and practical skills. If, for example, she takes a job in finance, she will probably do well as an analyst, but then be in trouble if she makes it to the next level and has to deal with high levels of uncertainty and change. If she goes into academia, she will do well in analyzing and critiquing the works of others, but have difficulty coming up with her own original ideas or syntheses. If she tries law, she will likely succeed as an associate, but her lack of practical skills may cause her problems in the courtroom or even working with clients. Thus, one hopes that she will indeed develop a broader repertoire of skills.

Consider, in contrast, Barbara, a highly creative student. Barbara's grades were good, although by no means spectacular. Her teachers thought she was just terrific as a source of new and exciting ideas, despite the fact that her standardized test scores were very weak. She also did not excel in courses that mostly required memorization. Despite Barbara's mediocre scores on standardized tests and in some courses, she was enormously creative. As an undergraduate, she was publishing articles in refereed journals. If one were to look at her in a standard way—in terms of her ability to memorize—she would look third-rate at best. If one were to count her creativity, she might well appear as one of the best students in her class.

Barbara's creativity in itself will get her far, but perhaps not as far as she would wish. But creative skills in themselves are not enough. If she goes into design—art, architecture, advertising, or whatever—she will need somehow to develop skill in distinguishing her better ideas from her not as good ones. If she does sales, she will need to hone her practical skills so that she comes up not only with creative ways of selling products, but also of connecting with other people. In general, people who are creative but not practical often are frustrated that they have great ideas that they cannot convince others to adopt.

Celia was a student whose academic performance was good, but not great. She had good academic skills, but none that made her stand out. She gave us quite a surprise when it came to getting a job. Everyone wanted to hire her. And that raised an intriguing question. Why would someone who lacked Alice's analytical ability and Barbara's creative ability do spectacularly well in the job market? The answer was that Celia had an abundance of practical intelligence, or put simply, common sense. Celia could go into an environment, figure out what she needed to do to adapt successfully in that environment, and then do it. For example, Celia knew how to interview effectively, how to interact well with other students, how to get her work done. She was also aware of the kinds of things that do and do not work in an academic environment. She knew something that is seldom acknowledged: that in school, as in other aspects of life, one needs a certain amount of practical savvy in order to succeed.

Celia's practical abilities are a great asset that will be useful to her in later life. But she will need other kinds of skills as well. People with high levels of practical skills without corresponding creative skills usually end up selling ideas, but those of others rather than of their own. Moreover, if they lack analytical skills, they may find themselves selling ideas that are not very good, but doing so successfully because of their ability to connect with people. In politicians, where I suspect such a pattern is common, there often seems to be a wide gap between the individual's ideas and his or her ability to sell them, with the latter outshining the former.

It is interesting to compare Alice, Barbara, and Celia with Paul. Paul combined Alice's analytical skills with Barbara's creative ones. As a result, many faculty members thought he would be extremely

successful. I did not. The reason was that although Paul was very bright in some ways, he was notably challenged with regard to practical intelligence. He was the kind of student who was bright and who knew it. He had become very arrogant. But even arrogant people can get where they want to go if they know how to control their arrogance. Paul did not know. Although he received many job interviews, he was offered only one job, the worst one for which he applied. The reason was that he was unable or unwilling to hide his arrogance the one day that is essential to do so—the day of the job interview. Almost no one wanted to hire him. And he did not last long even at the place that was willing to hire him.

I have described these four students at some length in order to argue that intelligence is not merely what intelligence tests test. These skills matter, particularly in courses that emphasize memory and analysis. Intelligence tests, but also other tests of cognitive and academic skills, thus measure part of the range of intellectual skills. They do not measure the whole range. One should not conclude that a person who does not test well is not smart. Rather, one should merely look at test scores as one indicator among many of a person's intellectual skills. Practical and academic (or analytical) intelligence are separable sets of skills with different consequences. Even the tests that teachers use to measure achievement in college may be overly narrow if they do not assess students' skills in going well beyond the knowledge with which they have been presented (creative thinking) and the students' skills in applying that knowledge in the real world (practical thinking).

Permit me to add one last example. As a freshman at Yale, I was extremely eager to major in psychology because I had done poorly on IQ tests as a child and wanted to understand why. I took the introductory psychology course and got a C. My professor at one point stared at me and commented that there was a famous Sternberg in the field of psychology (Saul Sternberg) and that it was obvious there would not be another one. Thirty-five years later, I was back in the same institution as a chaired professor and as president of the American Psychological Association. I commented to my predecessor, Phil Zimbardo, a professor at Stanford, that it was ironic that the president of the association, the largest association of psychologists in the world, was a C student in introductory psychology. At that point, he commented that he, too, had received a C in this course. This experience clarified for me the great

difference between the memorization and rudimentary analytical skills required for success in many college courses, especially introductory ones, and the skills needed for success in later-life careers. I had never once had to memorize a book or lecture as a professional, but I had had to teach students individually and in groups; do research; get grant proposals funded; negotiate the prickly world of academic politics; and so forth. I had needed a blend of analytical, creative, and practical skills that were only minimally tapped by the teaching and assessment of my early college years, especially in my chosen field of pursuit.

The problem is that many students may be discouraged from pursuing careers in which they can be successful and contribute greatly because they do not do well in the introductory courses that often serve as gating mechanisms for determining who will go on to the advanced courses. If the skills required for success in these introductory courses are largely different from the skills required for success in more advanced and especially later in a corresponding career, potentially successful people may drop out of the field. Moreover, those who stay in the field may not be those who will succeed best later. Probably all of us who teach graduate students have encountered at least a handful who are good at taking knowledge-based tests, but who lack the creative, analytical, and practical skills they need to do research and to practice in a given field.

Academic or analytical intelligence is the primary vehicle for success through much of college, unless, in advanced (or even intermediate) courses, students are encouraged to produce projects, products, and portfolios that require more creative and practical thinking. Typically, the role of creative and practical intelligence gets higher toward the end of college. But in schools with large classes, even in the latter years, the creative and practical aspects may never come to the fore.

The Academic/analytic versus the Creative and Practical Aspects of Intelligence

The discussion so far suggests that intelligence is broader than the notion of general intelligence (*g*) that has dominated discussions in the past century (Carroll, 1993; Jensen, 1998; Spearman, 1904). One might wonder why there is a need to distinguish between analytical (academic) intelligence, on the one hand, and creative and practical intelligence, on the other. Consider some of the data.

Creative intelligence and general cognitive ability. When we think of creativity, eminent artists or scientists such as Michelangelo or Einstein immediately come to mind. However, these highly creative people are quite rare and difficult to study in the psychological laboratory. In his American Psychological Association address, Guilford (1950) noted that these problems had limited research on creativity. He proposed that creativity could be studied in everyday subjects using paper-and-pencil tasks. One of these was the Unusual Uses Test, in which an examinee thinks of as many uses for a common object (e.g., a brick) as possible. Many researchers adopted Guilford's suggestion, and "divergent thinking" tasks quickly became the main instruments for measuring creative thinking. The tests were a convenient way of comparing people on a standard "creativity" scale.

Building on Guilford's work, Torrance (1974) developed the Torrance Tests of Creative Thinking. These tests consist of several relatively simple verbal and figural tasks that involve divergent thinking plus other problem-solving skills. The tests can be scored for fluency (total number of relevant responses), flexibility (number of different categories of relevant responses), originality (the statistical rarity of the responses), and elaboration (amount of detail in the responses). Some of subtests from the Torrance battery include: 1 . Asking questions: The examinee writes out all the questions he or she can think of, based on a drawing of a scene. 2. Product improvement: The examinee lists ways to change a toy monkey so children will have more fun playing with it. 3 . Unusual uses: The examinee lists interesting and unusual uses of a cardboard box. 4. Circles: The examinee expands empty circles into different drawings and titles them. A number of investigators have studied the relationship between creativity and intelligence, at least as measured by IQ. Three basic findings concerning creativity and conventional conceptions of intelligence are generally agreed upon (see, e.g., Barron & Harrington, 1981; Lubart, 1994).

First, creative people tend to show above-average IQs, often above 120 (see Renzulli, 1986). This figure is not a cutoff, but rather an expression of the fact that people with low or even average IQs do not seem to be well represented among the ranks of highly creative individuals. Cox's (1926) geniuses had an estimated average IQ of 165. Barron estimated the mean IQ of his creative writers to be 140 or higher,

based on their scores on the Terman Concept Mastery Test (Barron, 1963, p. 242). It should be noted that the Concept Mastery Test is exclusively verbal, and thus provides a somewhat skewed estimate of IQ. The other groups in the Institute for Personality Assessment (IPAR) studies, that is, mathematicians and research scientists, were also above average in intelligence. Anne Roe (1952, 1972), who did similarly thorough assessments of eminent scientists before the IPAR group was set up, estimated IQs for her participants that ranged between 121 and 194, with medians between 137 and 166, depending on whether the IQ test was verbal, spatial, or mathematical.

Second, above an IQ of 120, IQ does not seem to matter as much to creativity as it does below 120. In other words, creativity may be more highly correlated with IQ below an IQ of 120, but only weakly or not at all correlated with it above an IQ of 120. (This relationship is often called the threshold theory.) In the architects' study, in which the average IQ was 130 (significantly above average), the correlation between intelligence and creativity was $-.08$, not significantly different from zero (Barron, 1969, p. 42). However, in the military officer study, in which participants were of average intelligence, the correlation was $.33$ (Barron, 1963, p. 219). These results suggest that extremely highly creative people often have high IQs, but not necessarily that people with high IQs tend to be extremely creative (see also Getzels & Jackson, 1962). Some investigators (e.g., Simonton, 1994; Sternberg, 1996) have suggested that very high IQ may actually interfere with creativity. Those who have very high IQs may be so highly rewarded for their IQ-like (analytical) skills that they fail to develop the creative potential within them, which may then remain latent.

Third, the correlation between IQ and creativity is variable, usually ranging from weak to moderate (Flescher, 1963; Getzels & Jackson, 1962; Guilford, 1967; Herr, Moore, & Hasen, 1965; Torrance, 1962; Wallach & Kogan, 1965; Yamamoto, 1964). The correlation depends in part on what aspects of creativity and intelligence are being measured, how they are being measured, and in what field the creativity is manifested. The role of intelligence is different in art and music, for instance, than it is in mathematics and science (McNemar, 1964). An obvious drawback to the tests used and assessments done

by Roe and Guilford is the time and expense involved in administering them, as well as the subjective scoring of them.

In contrast, Mednick (1962) produced a 30-item, objectively scored, 40-minute test of creative ability called the Remote Associates Test (RAT). The test is based on his theory that the creative thinking process is the “forming of associative elements into new combinations which either meet specified requirements or are in some way useful. The more mutually remote the elements of the new combination, the more creative the process or solution” (Mednick, 1962). Because the ability to make these combinations and arrive at a creative solution necessarily depends on the existence of the combinations (i.e., the associative elements) in a person’s knowledge base, and because the probability and speed of attainment of a creative solution are influenced by the organization of the person’s associations, Mednick’s theory suggests that creativity and intelligence are very related; they are overlapping sets. Moderate correlations of .55, .43, and .41 have been shown between the RAT and the WISC (Wechsler Intelligence Scale for Children), the SAT verbal, and the Lorge-Thorndike Verbal intelligence measures, respectively (Mednick & Andrews, 1967). Correlations with quantitative intelligence measures were lower ($r = .20 - .34$). Correlations with other measures of creative performance have been more variable (Andrews, 1975). This psychometric approach for measuring creativity had both positive and negative effects on the field. On the positive side, the tests facilitated research by providing a brief, easy to administer, objectively scorable assessment device. Furthermore, research was now possible with “everyday” people (i.e., noneminent samples). However, there were also some negative effects.

First, some researchers criticized brief paper-and-pencil tests as trivial, inadequate measures of creativity; larger productions such as actual drawings or writing samples should be used instead. Second, other critics suggested that no fluency, flexibility, originality, and elaboration scores captured the concept of creativity. In fact, the definition and criteria for creativity are a matter of ongoing debate, and relying on the objectively defined statistical rarity of a response with regard to all the responses of a subject population is only one of many options. Other possibilities include using the social consensus of judges (see Amabile, 1983). Third, some researchers were less enchanted by the assumption that noneminent

samples could shed light on eminent levels of creativity, which was the ultimate goal for many studies of creativity (e.g., Simonton, 1984). Thus, a certain malaise developed and continues to accompany the paper-and-pencil assessment of creativity. Some psychologists, at least, avoided this measurement quagmire in favor of less problematic research topics.

Practical intelligence and general cognitive ability. General cognitive ability (*g*) is considered by many to be the best single predictor of job performance (e.g., Hunter, 1986; Ree, Earles, & Teachout, 1994; Schmidt & Hunter, 1998). The relationship between *g* and performance is attributed largely to the direct influence of *g* on the acquisition of job-related knowledge (Borman et al., 1993; Hunter, 1986; Schmidt et al., 1986). Many job-knowledge tests, however, assess primarily declarative knowledge of facts and rules (McCloy, Campbell, & Cudeck, 1994). They consist of abstract, well-defined problems that are similar to the types of problems found on traditional intelligence tests, thus explaining the observed correlations between measures of job knowledge and cognitive ability tests. Practical-intelligence tests, however, consist of problems that are poorly defined and context-specific. Such tests present practical, often work-related problems, that test-takers need to solve. We consider performance on these tests to be a function of practical rather than of abstract, general intelligence.

It is possible, however, to test practical intelligence as a separate entity. Tests of this construct usually give people situation-based problems related to their life or their work and ask them to resolve the problems. For example, a college student might be asked how to resolve a conflict with another student over the cleanliness of a dormitory room, or a business executive might be asked how he or she would resolve a production problem creating a lack of inventory.

Practical-intelligence tests exhibit trivial to moderate correlations with measures of *g*. In other words, they measure skills different from *g*. Scores on practical-intelligence tests for academic psychologist and for managers correlated nonsignificantly (-.04 to .16) with a test of verbal reasoning in undergraduate samples (Wagner, 1987; Wagner & Sternberg, 1985). Scores on a practical-intelligence test for managers also exhibited a nonsignificant correlation with an IQ test for a sample of business

executives (Wagner & Sternberg, 1990). Similar findings were obtained with a test of practical intelligence for sales in samples of undergraduates and salespeople (Wagner, Sujan, Sujan, Rashotte, & Sternberg, 1999). In one study, conducted in Kenya, practical-intelligence scores actually correlated negatively with scores on tests of *g*, suggesting that, in certain environments, development of practical skills may be emphasized at the expense of development of academic skills (Sternberg et al., 2001). Such environments are not limited to rural Kenya: Artists, musicians, athletes, and craftsmen all may decide that development of skills other than those taught in school may hold more value to them than do the more academic skills.

In a study by Eddy (1988), the Armed Services Vocational Aptitude Battery (ASVAB) was administered along with a practical-intelligence test for managers to a sample of Air Force recruits. The ASVAB is a multiple-aptitude battery measuring verbal, quantitative, and mechanical abilities, and has been found to correlate highly with other conventional cognitive ability tests. Scores on the practical-intelligence test exhibited near-zero correlations with factor scores on the ASVAB, again suggesting a distinction between academic and practical intelligence. In research with military leaders, leaders at three levels of command completed Terman's (1950) Concept Mastery Test, a test of verbal reasoning, along with a practical-intelligence test for their respective level. Practical-intelligence scores exhibited trivial and nonsignificant to moderate and significant correlations (.02 to .25) with verbal reasoning ability (Hedlund et al., 2003).

The research reviewed above supports the contention that practical-intelligence tests measure abilities that are distinct from those assessed by traditional intelligence tests. But how do scores on these practical tests relate to job performance?

Practical intelligence and performance. First, consider job knowledge. In terms of predicting job performance, job-knowledge tests have been found to predict performance fairly consistently, with an average validity of .48 after correcting for various statistical factors (Schmidt & Hunter, 1998). Much of this prediction is attributed to the relationship between job knowledge and general cognitive ability tests

(Borman et al., 1993; Hunter, 1986). In other words, people with high *g* are expected to gain more knowledge and thus perform more effectively.

Practical-intelligence tests also have been found to predict performance in a number of domains, typically correlating generally in the range of .2 to .5 with criteria such as rated prestige of business or institution, salary, performance-appraisal ratings, number of publications, grades in school, and adjustment to college (Sternberg et al., 1995; Sternberg et al., 2000; Wagner, 1987; Wagner & Sternberg, 1985). We review some of these findings in more detail.

In studies with general business managers, practical-intelligence scores correlated in the range of .2 to .4 with criteria such as salary, years of management experience, and whether or not the manager worked for a company at the top of the Fortune 500 list (Wagner, 1987; Wagner & Sternberg, 1985). In a study with bank managers, Wagner and Sternberg (1985) obtained significant correlations between practical-intelligence scores and average percentage of merit-based salary increase ($r = .48, p < .05$) and average performance rating for the category of generating new business for the bank ($r = .56, p < .05$).

Although much of the practical-intelligence research has involved business managers (Sternberg et al., 2000), there is evidence that practical intelligence explains performance in other domains. In the field of academic psychology, correlations in the .3 to .4 range were found between practical-intelligence test scores and criterion measures such as citation rate, number of publications, and quality of department (Wagner, 1987; Wagner & Sternberg, 1985). Wagner et al. (1999) found correlations in the .3 to .4 range between the tacit knowledge of salespeople and criteria such as sales volume and sales awards received.

Two studies showed the incremental validity of practical-intelligence tests over traditional intelligence tests in predicting performance. In a study with business executives attending a Leadership Development Program at the Center for Creative Leadership, Wagner and Sternberg (1990) obtained a correlation of .61 between scores on a practical-intelligence test for managers and performance on a managerial simulation. Furthermore, practical-intelligence scores explained 32% of the variance in performance beyond scores on a traditional IQ test, and also explained variance beyond measures of

personality and cognitive style. In a study with military leaders, Hedlund et al. (2003) found practical-intelligence scores to correlate significantly at all three levels of command with ratings of leadership effectiveness made by subordinates, peers, or superiors, with correlations ranging from .14 to .42 (Hedlund et al., 2003). More importantly, practical-intelligence scores accounted for small (4 to 6%), but significant variance in leadership effectiveness beyond scores on tests of general verbal intelligence and tacit knowledge for managers.

In a study with Yup'ik Eskimo children, Grigorenko et al. (2004) found that practical intelligence was a better predictor of hunting, fishing, gathering, and related adaptive skills than was academic intelligence. Moreover, whereas urban children outperformed rural Yup'ik children on conventional intelligence tests, the rural Eskimo children outperformed the urban children on tests relevant to the adaptive demands of their rural lives.

Other researchers, using practical-intelligence tests or similar measures, also have found support for the relationship between practical intelligence and performance (e.g., Colonia-Willner, 1998; Fox & Spector, 2000; Pulakos, Schmitt, & Chan, 1996). Colonia-Willner administered the Tacit Knowledge Inventory for Managers (TKIM; Wagner & Sternberg, 1991), a practical-intelligence test, to bank managers along with measures of psychometric and verbal reasoning. She found that scores on the TKIM significantly predicted an index of managerial skill, whereas psychometric and verbal reasoning did not. Fox and Spector administered a situational judgment test to undergraduate students participating in a simulated interview. The students were asked to select the response they would most likely or least likely take to several work-related situations. Fox and Spector found that practical intelligence significantly predicted evaluations of the interviewee's qualifications. They also found that scores on the practical-intelligence test exhibited a moderate, significant correlation (.25) with a measure of general intelligence. Finally, Pulakos et al., using a practical-intelligence test specifically designed for entry-level professionals in a federal investigative agency, found that practical intelligence predicted both peer and supervisory ratings of performance. Furthermore, the effects of practical intelligence were not accounted

for by *g*. Thus, there is growing evidence to suggest that tests of practical intelligence and related tests not only explain individual differences in performance but also measure an aspect of performance that is not explained by measures of general intelligence.

In sum, if we were to consider only the academic aspect of intelligence, we would be considering only one aspect of what contributes to success in the world of work. If college were only to develop an academic skill set in students, it would ill prepare them for the world they later will confront.

Creativity

Introduction

Creativity is the potential to produce and implement ideas that are novel and high in quality. It goes beyond the creative intelligence discussed earlier, in that it contains attitudinal, motivational, personality, and environmental components as well as the cognitive one of creative intelligence. Creativity is not an attribute limited to the historic “greats,” such as Charles Darwin in the sciences, Pablo Picasso in art, Victor Hugo in literature, Bill Gates in technological entrepreneurship, or Abraham Lincoln in statesmanship. Rather, it is something anyone can use. In large part, it is a decision. So when we think about “creative ability,” we think of it largely in terms of a person’s decision to be creative—or not to be.

Creativity in a broad sense is important to active and engaged citizenship and to professional success. In a world that is rapidly changing, the ability flexibly to handle new challenges is essential. In 2008, two investment banks failed rapidly in succession: Bear-Stearns and then Lehman Brothers. Other investment banks, such as Goldman-Sachs, weathered the storm. What was the difference? The difference was the ability of top management to see that the future would not resemble the past, and that investment vehicles that in the past had been successful (such as high-risk mortgage-based securities) no longer would be. Those who were stuck in the past paid in the present.

Amabile (1983, 1996; Collins & Amabile, 1999) has described creativity as the confluence of intrinsic motivation, domain-relevant knowledge and abilities, and creativity-relevant skills. The creativity-relevant skills include (a) a cognitive style that involves coping with complexities and breaking

one's mental set during problem solving, (b) knowledge of heuristics for generating novel ideas, such as trying a counterintuitive approach, and (c) a work style characterized by concentrated effort, an ability to set aside problems, and high energy.

Gruber and his colleagues (Gruber & Davis, 1988) have proposed a developmental *evolving-systems model* for understanding creativity. A person's knowledge, purpose, and affect grow over time, amplify deviations that an individual encounters, and lead to creative products. Developmental changes in the knowledge system have been documented in cases such as Charles Darwin's thoughts on evolution. Purpose refers to a set of interrelated goals, which also develop and guide an individual's behavior. Finally, the affect or mood system notes the influence of joy or frustration on the projects undertaken.

Csikszentmihalyi (1988) has taken a different "systems" approach and highlights the interaction of the individual, domain, and field. An individual draws upon information in a domain and transforms or extends it via cognitive processes, personality traits, and motivation. The field, consisting of people who control or influence a domain (e.g., art critics and gallery owners), evaluates and selects new ideas. The domain, a culturally defined symbol system, preserves and transmits creative products to other individuals and future generations.

Gardner (1993a) has conducted case studies that suggest that the development of creative projects may stem from an anomaly within a system (e.g., tension between competing critics in a field) or moderate asynchronies between the individual, domain, and field (e.g., unusual individual talent for a domain). In particular, Gardner (1993a) has analyzed the lives of seven individuals who made highly creative contributions in the twentieth century, with each specializing in one of the multiple intelligences (Gardner, 1983).

Although creativity can be understood in terms of uses of the multiple intelligences to generate new and even revolutionary ideas, Gardner's (1993) analysis goes well beyond the intellectual. For example, Gardner pointed out two major themes in the behavior of these creative giants. First, they tended to have a matrix of support at the time of their creative breakthroughs. Second, they tended to drive a "Faustian bargain" whereby they gave up many of the pleasures people typically enjoy in life in

order to attain extraordinary success in their careers. It is not clear that these attributes are intrinsic to creativity, per se, however; rather, they seem to be associated with those who have been driven to exploit their creative gifts in a way that leads them to attain eminence.

Gardner further followed Csikszentmihalyi (1988, 1996) in distinguishing between the importance of the domain (the body of knowledge about a particular subject area) and the field (the context in which this body of knowledge is studied and elaborated, including the persons working with the domain, such as critics, publishers, and other “gate-keepers”). Both are important to the development, and ultimately, the recognition of creativity.

Investment Theory of Creativity

According to the investment theory of creativity, upon which this essay draws, creative thinkers are like good investors: They buy low and sell high (Sternberg & Lubart, 1995, 1996). They are willing and able to defy the crowd. Note that creative intelligence (ability) is important to creativity, but so is the attitude that defying the crowd is worthwhile, and the motivation actually to defy the crowd. Whereas investors buy low and sell high in the world of finance, creative people do so in the world of ideas. Creative people generate ideas that are like undervalued stocks (stocks with a low price-to-earnings ratio), and both the stocks and the ideas are generally rejected by the public. When creative ideas are proposed, they often are viewed as bizarre, useless, and even foolish, and are summarily rejected. The person proposing them often is regarded with suspicion and perhaps even with disdain and derision.

Creative ideas are both novel and valuable. But, they are often rejected because the creative innovator stands up to vested interests and defies the crowd. The crowd does not maliciously or willfully reject creative notions. Rather, it does not realize, and often does not want to realize, that the proposed idea represents a valid and advanced way of thinking. Society generally perceives opposition to the status quo as annoying and offensive. This perceptions are seen as reason enough to ignore innovative ideas.

Evidence abounds that creative ideas are often rejected (Sternberg & Lubart, 1995). Initial reviews of major works of literature and art are often negative. Toni Morrison’s *Tar Baby* received negative reviews when it was first published, as did Sylvia Plath’s *The Bell Jar*. The first exhibition in

Munch of the work of Norwegian painter Edvard Munch opened and closed the same day because of the strong negative response from the critics. Some of the greatest scientific papers have been rejected not just by one journal, but even by several journals before being published.

From the investment view, then, the creative person buys low by presenting a unique idea and then attempting to convince other people of its value. After convincing others that the idea is valuable, which increases the perceived value of the investment, the creative person sells high by leaving the idea to others and moving on to another idea. People typically want others to love their ideas, but immediate universal applause for an idea usually indicates that it is not particularly creative.

Creativity is as much a decision about and an attitude toward life as it is a matter of ability. Creativity is often obvious in young children, but it is harder to find in older children and adults because their creative potential has been suppressed by a society that encourages intellectual conformity.

Creative work, and the broad-based creativity underlying it, requires applying and balancing the three intellectual abilities—creative, analytical, and practical—all of which can be developed (Sternberg & Grigorenko, 2007; Sternberg & Williams, 1996). Creative ability is used to generate ideas. Everyone, even the most creative person, has better and worse ideas. Without well-developed analytical ability, the creative thinker is as likely to pursue bad ideas as to pursue good ones. The creative individual uses analytical ability to work out the implications of a creative idea and to test it. Practical ability is used to translate theory into practice and abstract ideas into practical accomplishments. It is also used to convince other people that an idea is valuable. For example, every organization has a set of ideas that dictate how things, or at least some things, should be done. When an individual proposes a new procedure, they must sell it by convincing others that it is better than the old one. Practical ability is also used to recognize ideas that have a potential audience.

Creativity requires these three skills. The person who is only creatively intelligent may come up with innovative ideas, but not be able to recognize or sell them. The person who is only analytical may be an excellent critic of other people's ideas, but is not likely to generate creative ideas. The person who is

only practical may be an excellent implementer or salesperson, but is as likely to implement or promote ideas or products of little value as to promote genuinely creative ideas.

What are some particular characteristics one can seek to develop in an individual so that he or she decides for creativity? Put another way, what kinds of attributes are important for creative thought and action? They include: 1. redefining problems; 2. questioning and analyzing assumptions; 3. selling creative ideas with the realization that the ideas will not sell themselves; 4. recognizing that knowledge is a double-edged sword—it can help or hurt creativity; 5. willingness to surmount obstacles; 6. willingness to take sensible risks; 7. tolerance of ambiguity; 8. self-efficacy; 9. finding what one loves to do; 10. willingness to delay gratification; 11. having a sense of humor and a sense of perspective about one's own strengths and limitations; and 12. having the courage to defy the crowd.

Creativity, like intelligence, is essential for effective citizenship and for making a difference to the world. But people can be intelligent and even creative, but foolish. Why? What attribute do they lack? I believe the attribute they lack is wisdom.

Wisdom

Introduction

Wisdom may be the most important attribute to seek in future citizens and professionals. People can be academically or practically intelligent, or creative, but not wise. People who use their cognitive skills for evil or even selfish purposes, or who ignore the well-being of others than themselves, may be smart—but foolish.

Historically, the concept of wisdom has been the object of philosophical inquiries (Robinson, 1990) since the Platonic dialogues in *The Republic*. More recently, with the emergence of psychology as a field of study separate from philosophy, the concept of wisdom has also been studied as a psychological construct, and a number of psychologists have attempted empirical investigation of the concept of wisdom and its manifestations (Sternberg, 1990; Sternberg & Jordan, 2005). Wisdom has been studied from a range of psychological perspectives (Sternberg, 2001). Some researchers (see Clayton 1975, 1982;

Holliday & Chandler, 1986; or Sternberg, 1990) have focused on implicit theories of wisdom, that is, on trying to understand how the layperson perceives and defines wisdom. Other researchers have adopted a developmental perspective to investigate how wisdom develops or fails to develop. Most noticeably, empirical work in this area was conducted by the late Paul Baltes and his colleagues at the Max Planck Institute in Berlin (e.g., Baltes & Staudinger, 1993, 2000). Another developmental approach to defining wisdom is to view it as postformal–operational thinking, extending beyond the traditional Piagetian stages of intelligence (Piaget, 1972).

Several researchers and theoreticians have focused on the importance of integration and balance in wisdom. Gisela Labouvie-Vief (1990), for example, has emphasized the balance between different kinds of thinking, suggesting that wisdom constitutes a balance of *logos*, which are objective and logical processes, and *mythos*, which represent subjective and organismic processes. Deborah Kramer (1990) has focused on the balance between various self-systems such as the cognitive, conative, and affective, arguing that wisdom involves integration of cognition and affect, resulting in a well-balanced personality, where the conscious and unconscious interact in harmony. Still others insist on the balance between different points of view (Kitchener & Brenner, 1990), or on “a balance between the opposing valences of intense emotion and detachment, action and inaction, knowledge and doubts” (Birren & Fisher, 1990, p.326). This essay will focus on a theory of wisdom proposed by Sternberg, which builds on previous theories emphasizing the importance of integration and balance in wisdom.

The Balance Theory of Wisdom

According to Sternberg’s balance theory of wisdom (Sternberg, 1998b, 2001), wisdom is defined as the application of intelligence, creativity, and knowledge as mediated by positive ethical values toward the achievement of a common good through a balance among (a) intrapersonal, (b) interpersonal, and (c) extrapersonal interests, over the (a) short- and (b) long-terms.

Wisdom is not just about maximizing one’s own or someone else’s self-interest, but about balancing various self-interests (intrapersonal) with the interests of others (interpersonal) and of other

aspects of the context in which one lives (extrapersonal), such as one's city or country or environment or even God. Wise people, such as Nelson Mandela, Mother Teresa, or Martin Luther King, see far beyond their own personal interests to the interests of others and of society as well.

A person could be practically intelligent, but use his or her practical intelligence toward bad or selfish ends. In wisdom, one certainly may seek good ends for oneself, but one also seeks common good outcomes for others. If one's motivations are to maximize certain people's interests and minimize other people's, wisdom is not involved. In wisdom, one seeks a common good, realizing that this common good may be better for some than for others.

Problems requiring wisdom always involve at least some element of each of intrapersonal, interpersonal, and extrapersonal interests. For example, when a president decides to go to war, or a CEO decides to introduce a wholly new product line, or a university president decides to open a new school (e.g., a law school or a medical school), the consequences are large and affect many persons as well as institutions. And the decision always has to be made in the context of what the whole range of available options is. But wisdom can apply in smaller decisions as well, such as whether to move to a new location to take a new job when one's spouse is already happily employed in the place where the couple lives.

What kinds of considerations might be included under each of the three kinds of interests? Intrapersonal interests might include the desire to enhance one's popularity or prestige, to make more money, to learn more, to increase one's spiritual well-being, to increase one's power, and so forth. Interpersonal interests might be quite similar, except as they apply to other people rather than oneself. Extrapersonal interests might include contributing to the welfare of one's school, helping one's community, contributing to the well-being of one's country, or serving God, and so forth. Different people balance these interests in different ways. At one extreme, a malevolent dictator might emphasize his or her own personal power and wealth; at the other extreme, a saint might emphasize only serving others and God.

What are the characteristics of people who are analytically intelligent and perhaps even creative, but foolish? I propose five characteristics, based on Sternberg (2002).

The first is egocentrism. Many smart people have been so highly rewarded in their lives that they lose sight of the interests of others. They start to act as though the whole world revolves around them. In doing so, they often set themselves up for downfalls, as happened to Dennis Kozlowski, formerly CEO of Tyco, who spent company money extravagantly on himself and his wife as though company resources were to be tapped as his own personal piggybank.

The second characteristic is a false sense of omniscience. Smart people typically know a lot. They get in trouble, however, when they start to think they “know it all.” They may have expertise in one area, but then, start to fancy themselves experts in practically everything. At that point, they become susceptible to remarkable downfalls, because they act as experts in areas where they are not, and can make disastrous mistakes in doing so. Colin Powell, typically known for his wisdom, some years ago gave a speech to the United Nations that was widely watched around the world. It described in detail the evidence for the weapons of mass destruction that Iraq was alleged to possess. Many people were impressed with the seeming near omniscience of US intelligence agencies about the Iraqi weapons program. It later turned out that almost the entire speech was based on false intelligence.

The third characteristic is a false sense of omnipotence. Many smart people find themselves in positions of substantial power. Sometimes they lose sight of the limitations of their power, and start to act as though they are omnipotent. Several U.S. presidents as well as presidents of other countries have had this problem, leading their countries to disasters on the basis of personal whims. Many corporate chieftains have also started to think of themselves as omnipotent, unfortunately, cooking the books of their corporations at will. Robert Mugabe, when I write this essay current “president” of Zimbabwe, seems to feel that there is no indignity too great to heap upon his own countrymen. Adolph Hitler seemed to believe that no one and nothing could stop him in his quest for world domination.

The fourth characteristic is a false sense of invulnerability. Not only do the individuals think they can do anything; they also believe they can get away with it. They believe that either they are too smart to be found out or, even if found out, they will escape any punishment for misdeeds. The result is the kind of disasters the United States has seen in the recent Enron, Worldcom, and Arthur Andersen

debacles. Mugabe, mentioned above, has been quoted as saying that only God can remove him from power. That is about as close to invulnerable as a dictator can feel, in today's world or any other.

Andrew Fastow, a graduate of the university in which I teach, seemed to believe that no one would ever be able to decipher the complex fraudulent schemes by which he enriched himself at the expense of Enron employees, customers, and shareholders.

The fifth characteristic is a false sense of ethical disengagement. One comes to believe that ethics apply to others but not to oneself. Those who are ethically disengaged insist on ethical behavior from all people except themselves. A number of television evangelists, such as Jimmy Swaggert, Jim Bakker, and Ted Haggard preached to tens of thousands of people about the wages of sins, while committing at gross levels the very sins of which they warned others.

Academic intelligence, practical intelligence, creativity, and wisdom are important attributes of success in life. When one comes up with an idea, one needs to be creative to ensure that the idea is novel; analytical to ensure that the idea is good; practical to ensure the idea can be implemented and that people can be persuaded of its value; and wise to ensure that the idea helps achieve a common good.

For these characteristics to be useful as criteria in a program, they need to be identifiable. How does one identify these attributes in individuals? Can they be taught for and measured?

TEACHING AND ASSESSMENT WITH WICS

The question arises: How can the WICS model be operationalized? Consider, in turn, teaching and assessment.

Teaching with WICS

It is important to teach students not just to learn facts, but also to think analytically, creatively, practically, and wisely (Sternberg & Grigorenko, 2007; Sternberg, Jarvin, & Grigorenko, in press).

Teaching Analytically

Teaching *analytically* means encouraging students to (a) analyze, (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) Analyze 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. [History of 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 a solution to a mathematical problem, and discuss weaknesses in the solution, if there are any. [Mathematics]

(f) Assess the strategy used by a winning player in a tennis match you just observed, stating what techniques she used in order to defeat her opponent. [Physical Education]

Teaching Creatively

Teaching *creatively* means encouraging students to (a) create, (b) invent, (c) discover, (d) imagine if..., (e) suppose that..., (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 a 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 French man 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

Teaching *practically* means encouraging students to (a) apply, (b) use, (c) put into practice, (d) implement, (e) employ, (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. Consider some examples:

(a) Apply the formula for computing compound interest to a problem people are likely to face when planning for retirement. [Economics, Math]

(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. [Athletics]

(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. [Math]

(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 Analytically, Creatively, and Practically

Although these examples emphasize how it is possible to teach analytical, creative, and practical thinking as distinct sets of skills, in real life, the large majority of problems require some combination of the three sets of skills. Consider, for example, the problem of a business, such as a technology company, that realizes its product lines are becoming obsolete. Once upon a time, it might have created buggy whips. Today, it might create SUVs. What should the company do? It might decide to close or go into bankruptcy. But, in many cases, companies can survive if they define the problem in a different way. For example, the company specializing in SUVs might start emphasizing smaller, more fuel-efficient cars. Or it might switch to smaller SUVs. Or it might merge with a company that produces smaller cars. It needs creative managers to come up with ideas to save it. It needs analytical managers to evaluate the various options. And it needs practical managers who can take the ideas and make them work in practice. But it also needs wise managers who think about larger questions, such as whether there is still a role for SUVs in a society in which gas prices are soaring and large vehicles are polluting the world to a dangerous extent.

Teaching for Wisdom

Teachers who teach for *wisdom* will explore with students the notion that conventional abilities and achievements are not enough for professional success as well as a meaningful life. Many people become trapped in their lives and, despite feeling conventionally successful, feel that their lives lack meaning, at least in the sense of contributing to a good that is larger than their own. Contributing to a

common good is not an alternative to success, but rather, is an aspect of it that, for most people, goes beyond money, promotions, large houses, and so forth. The teacher will further demonstrate how wisdom is critical for a life that makes a positive difference to the world. In the long run, wise decisions benefit people in ways that foolish decisions never do. The teacher must teach students the usefulness of interdependence -- a rising tide raises all ships; a falling tide can sink them.

It is also important to role model wisdom, because what you do is more important than what you say. Wisdom is in what you do, not just in what you say. So students should read about wise judgments and decision making in the context of the actions that followed so that the students understand that such means of judging and decision making exist. Teachers need to help students to learn to recognize their own interests, those of other people, and those of institutions. They need further to help students learn to balance their own interests, those of other people, and those of institutions. They will teach students that the "means" by which the end is obtained matters, not just the end. Students need to be encouraged to form, critique, and integrate their own values in their thinking. They further need to learn to think dialectically, realizing that both questions and their answers evolve over time, and that the answer to an important life question can differ at different times in one's life (such as whether to marry). Wisdom further requires them to learn to think dialogically, whereby they understand interests and ideas from multiple points of view. For example, what one group views as a "settler," another may view as an "invader." Most importantly, students need to learn to search for and then try to reach the common good -- a good where everyone wins and not only those with whom one identifies.

Teaching for wisdom will succeed only if teachers encourage and reward wisdom. Teacher must make wisdom real for students' lives. Teachers should teach students to monitor events in their lives and their own thought processes about these events. One way to learn to recognize others' interests is to begin to identify your own. They also should help students understand the importance of inoculating oneself against the pressures of unbalanced self-interest and small-group interest.

Students will develop wisdom by becoming engaged in class discussions, projects, and essays that encourage them to discuss the lessons they have learned from both classical and modern works and

how these lessons can be applied to their own lives and the lives of others. They need to study not only “truth,” as we know it, but values. The idea is not to force-feed a set of values, but to encourage students reflectively to develop their own prosocial ones.

Students should be encouraged to think about how almost everything they study might be used for better or worse ends, and to realize that the ends to which knowledge put *do* matter. Teachers need to realize that the only way they can develop wisdom in their students is to serve as role models of wisdom themselves. A role model of wisdom will, I believe, take a much more Socratic approach to teaching than teachers customarily do. Students often want large quantities of information spoon-fed or even force-fed to them. They then attempt to memorize this material for exams, only to forget it soon thereafter. In a wisdom-based approach to teaching, students will need to take a more active role in constructing their learning.

For example, in history, one might ask whether the term “settler” has a different meaning to those who are settling versus those who view themselves as already living the land being settled (e.g., American Indians in the 18th century). In science, one might ask how a new discovery or invention could be put to good or base use for society. In literature, one might ask whether a great little figure, such as King Lear, was wise, and if not, why not. In foreign language, one might ask whether there is wisdom to be learned from another culture that our culture seems to lack. In mathematics, one might ask how mathematical formulas, such as those forming the bases of building bridges, can create a better life for many people. In art, one might ask how wise versus foolish people are depicted by different artists. In music, one might ask whether one can appreciate the music of people, such as Richard Wagner, who had hateful prejudices against certain groups of people (in Wagner’s case, Jews).

Slavery is a topic that lends itself particularly well to teaching for wisdom (Reznitskaya & Sternberg, 2004; Sternberg, Reznitskaya, & Jarvin, 2007). How could a whole country allow slavery, as the United States once did? What were the people thinking? Could a country allow such thinking only by viewing the slaves as less than human? Did slavery show the human capacity for rationalization in the place of wisdom? In our own unit on slavery in a program for teaching American history, we consider the

formation, implementation, and abolition of slavery from the standpoint of wisdom-based thinking (see Reznitskaya & Sternberg, 2004).

We are implementing many of the ideas described here in a curriculum that has been developed at Tufts University for a leadership minor. The leadership minor provides an opportunity for undergraduate students to learn about leadership as it applies in whatever discipline they happen to be studying. The minor has three tiers. The first tier comprises courses on leadership and ethics, such as Psychology of Leadership and Sociology of Leadership. The second tier comprises courses across many departments in the liberal arts and sciences that touch on leadership. For example, students might study leadership through the eyes of Macbeth, or of an 18th century artist drawing leaders, or of an historian studying the American Revolution, or of a scholar of comparative political systems. The third tier comprises a leadership practicum, which requires the student to engage in a practical leadership experience and then to write a reflection paper on it that relates what he or she has learned in the practicum to what was learned in the classroom.

How does a leadership minor develop WICS? Consider an example from my own course on leadership? On the first day of my class last spring, I went over the syllabus, which involved a lot of work. A student raised his hand and challenged me, saying the course was too much work and it was obvious that I was out of touch with the lives of students. I explained to the class that this challenge was quite embarrassing, as I was supposed to be the leader of the class and now my authority was being publicly challenged. I explained that, in leadership, the question is not whether your authority will be publicly challenged—it will be—but rather, how you respond to such challenges. I told them that I just was not sure how to respond to the challenge and that I hoped they would help me. I divided them into three groups and asked each group to simulate what had happened and then also simulate how I should respond, as well as the likely potential outcome. I then thanked the shill I had planted in the class to do this demonstration (an assistant in the dean's office), and he left. This exercise, and others like it, gave students an opportunity to think creatively in generating a response to the challenge, analytically, in

deciding whether the response is a good one, practically in implementing their response through a simulation, and wisely in ensuring that the response helps to achieve a common good.

Assessment with WICS

If we are going to teach for WICS, we must learn to assess for WICS. In general, it is important in education that the way we assess skills matches the way we teach them. How does one assess the various WICS abilities? I will describe two studies, the first of which did not involve assessing wisdom, the second of which did. The goal of both of these studies is to select and provide a basis for developing reflective, active citizens and professionals who will make a positive difference in their own lives and to the world. They will be citizens prepared for the challenges of the world, not just of what may be sometimes narrowly focused classrooms.

In a recent study supported by the College Board (Sternberg & the Rainbow Project Collaborators, 2006), we used an expanded set of tests on 1015 students at 15 different institutions (13 colleges and 2 high schools). Our goal was not to replace the SAT, but to devise tests that would supplement the SAT, measuring skills that this test does not measure. In addition to multiple-choice tests, we used 3 additional measures of creative skills and 3 of practical skills:

Creative skills. The three additional tests were as follows:

1. *Cartoons.* Participants were given five cartoons purchased from the archives of the *New Yorker*, but with the caption removed. The participant's task was to choose three cartoons, and to provide a caption for each cartoon. Two trained judges rated all the cartoons for cleverness, humor, and originality. A combined creativity score was formed by summing the individual ratings on each dimension.

2. *Written Stories.* Participants were asked to write two stories, spending about 15 minutes on each, choosing from the following titles: "A Fifth Chance," "2983," "Beyond the Edge," "The Octopus's Sneakers," "It's Moving Backwards," and "Not Enough Time." A team of four judges was trained to rate the stories for originality, complexity, emotional evocativeness, and descriptiveness.

3. *Oral Stories*. Participants were presented with five sheets of paper, each containing a set of pictures linked by a common theme. For example, participants might receive a sheet of paper with images of a musical theme, a money theme, or a travel theme. The participant then chose one of the pages and was given 15 minutes to formulate a short story and dictate it into a cassette recorder. The dictation period was not to be more than five minutes long. The process was then repeated with another sheet of images so that each participant dictated a total of two oral stories. Six judges were trained to rate the stories for originality, complexity, emotional evocativeness, and descriptiveness.

Practical skills. The additional tests were as follows:

1. *Everyday Situational Judgment Inventory (Movies)*. This video-based inventory presents participants with seven brief vignettes that capture problems encountered in general, everyday life, such as determining what to do when one is asked to write a letter of recommendation for someone one does not know particularly well.

2. *Common Sense Questionnaire*. This written inventory presents participants with 15 vignettes that capture problems encountered in general business-related situations, such as managing tedious tasks or handling a competitive work situation.

3. *College Life Questionnaire*. This written inventory presents participants with 15 vignettes that capture problems encountered in general college-related situations, such as handling trips to the bursar's office or dealing with a difficult roommate.

We found that our tests significantly and substantially improved upon the validity of the SAT for predicting first-year college grades (Sternberg & the Rainbow Project Collaborators, 2006), doubling prediction over the SAT alone, and increasing prediction by 50% over SATs and high school grade-point average. The test also improved equity: Using the test to admit a class would result in greater ethnic diversity than would using just the SAT or just the SAT and grade-point average. Stemler, Grigorenko, Jarvin, and Sternberg (2006) found that it is possible as well to reduce ethnic-group differences on certain Advanced Placement (AP) examinations by including creative and practical questions on them.

The Rainbow Project did not assess wisdom, but wisdom is important to producing active and successful citizens and professionals. Tufts University in Medford, Massachusetts, USA, has strongly emphasized the role of active citizenship in education. It has 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 (for more details, see Sternberg, 2007, 2008a).

We placed on the 2006-2007 application for all of the over 15,000 students applying to Arts, Sciences, and Engineering at Tufts, questions designed to assess wisdom, analytical and practical intelligence, and creativity synthesized (WICS) (Sternberg, 2003). The program was continued for 2007-2008 and is being continued for 2008-2009, but the data reported here are for the first year, for which we have more nearly complete data.

WICS is a theory of that extends the theory of successful intelligence on the basis of the notion that some people may be academically and even practically intelligent, but unwise, as in the case of corporate scandals, and in the case of numerous political scandals as well. The perpetrators were smart, well-educated, and foolish. The conception of wisdom used here is that of the balance theory of wisdom (Sternberg, 1998b), according to which wisdom is the application of intelligence, creativity, and knowledge for the common good, by balancing intrapersonal, interpersonal, and extra-personal interests, over the long and short terms, through the infusion of positive ethical values.

The questions were optional in the first two years. 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 supplement to the Common Application (Sternberg, 2007). It just was not practical to administer a separate high-stakes test such as the Rainbow assessment for admission to one university. Moreover, the advantage 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.

Students were encouraged to answer just a single question so as not overly to burden them. Tufts University competes for applications with many other universities, and if our application was

substantially more burdensome than those of our competitor schools, it would put us at a real-world disadvantage in attracting applicants. In the theory of successful intelligence, successful intelligent individuals capitalize on strengths and compensate for or correct weaknesses. Our format gave students a chance to capitalize on a strength.

As examples of items, 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-based question asked students how a passion they had could be applied toward a common good.

Analytical quality was assessed by the cogency, organization, logic, and balance of the essay. Creativity was assessed by looking for novelty, quality, and task-appropriateness. Practicality was a matter of the utility with respect to human and material resources, as well as persuasiveness. Wisdom was assessed by the extent to which the response represented the use of abilities and knowledge for a common good by balancing one’s own, others’, and institutional interests over the long and short terms through the infusion of positive ethical values.

Note that the goal is not to replace SAT and other traditional admissions measurements like grade point averages and class rank with some new test. Rather, it is to re-conceptualize applicants in terms of academic/analytical, creative, practical, and wisdom-based abilities, using the essays as one but not the only source of information. For example, highly creative work submitted in a portfolio also could be entered into the creativity rating, or evidence of creativity through winning of prizes or awards. The essays were major sources of information, but if other information was available, the trained admissions officers used it.

We now have some results of our first year of implementation, and they are very promising. Applicants were evaluated for creative, practical, and wisdom-based skills, if sufficient evidence was available, as well as for academic (analytical) and personal qualities in general.

Among the applicants who were evaluated as being academically qualified for admission, approximately half completed an optional essay. Merely doing these essays had no meaningful effect on chances of admissions. However, *quality* of essays or other evidence of creative, practical, or wisdom-based abilities did have an effect. For those rated as an “A” (top rating) by a trained admission officer in any of these three categories, average rates of acceptance were roughly double those for applicants not getting an A. Because of the large number of essays (over 8000), only one rater rated applicants except for a sample to ensure that inter-rater reliability was sufficient, which it was.

Many measures do not look like conventional standardized tests, but have statistical properties that mimic them. We were therefore interested in what is called the “convergent-discriminant validation” of our measures—showing that they measure what they should measure and do not measure what they should not measure. The correlation of our measures with a rated academic composite that included SAT scores and high school GPA were modest but significant for creative, practical thinking, and wise thinking. The correlations with a rating of quality of extracurricular participation and leadership were moderate for creative, practical, and wise thinking. Thus, the pattern of convergent-discriminant validation was what we had hoped for: The assessments correlated with what they were supposed to correlate with, and did not correlate with what they were not supposed to correlate with.

The average academic quality of applicants in Arts & Sciences rose in slightly 2006-7, the first year of the pilot, in terms of both SAT and high school grade-point average. In addition, there were notably fewer students in what before had been the bottom third of the pool in terms of academic quality. Many of those students, seeing the new application, seem to have decided not to bother to apply. Many more strong applicants applied. After one semester of study, students who had A’s on Kaleidoscope were performing just as well as other students.

Thus, adopting these new methods does not result in less qualified applicants applying to the institution and being admitted. Rather, the applicants who are admitted are *more* qualified, but in a broader way. Perhaps most rewarding were the positive comments from large numbers of applicants that they felt our application gave them a chance to show themselves for who they are. Of course, many factors are involved in admissions decisions, and Kaleidoscope ratings were only one small part of the overall picture.

We did not get meaningful differences across ethnic groups, a result that surprised us, given that the earlier Rainbow Project reduced but did not eliminate differences. And after a number of years in which applications by underrepresented minorities were relatively flat in terms of numbers, this year they went up substantially. In the end, applications from African Americans and Hispanic-Americans increased significantly, and admissions of African-Americans were up 30% and of Hispanic-Americans up 15%. So our results, like those of the Rainbow Project, showed that it is possible to increase academic quality and diversity simultaneously, and to do so in for an entire undergraduate class at a major university, not just for small samples of students at some scattered schools. Most importantly, we sent a message to students, parents, high school guidance counselors, and others, that we believe that there is a more to a person than the narrow spectrum of skills assessed by standardized tests, and that these broader skills can be assessed in a quantifiable way.

CONCLUSIONS

In developing the active, involved, and reflective citizens and professionals of tomorrow, some very important factors to consider are academic and practical intelligence, creativity, and wisdom—synthesized so that they work together effectively. I am not claiming that these are the only attributes that matter. For example, motivation is extremely important as well. I do believe, however, that motivation is partly (although not exclusively) situational, and that with the proper environment, anyone can be motivated to achieve.

A major problem we face is that the way we teach often does not correspond to the way students need to learn to succeed in life, and particularly, in the careers for which students are preparing. The skill

sets required in school and on the job may overlap only weakly. The result may be unprepared job-seekers, and seekers of jobs who might be better off doing something other than what they have chosen. At the same time, students who might have chosen and succeeded in a career may be discouraged from entering that career because they did not succeed as well as they had hoped in the introductory courses supposed to prepare them for that career.

Colleges and universities should consider pooling their resources and developing a common model and common methods of assessment. By working separately, they fail to leverage their strengths and to share information regarding the best ways to make decisions. In essence, each institution “reinvents the wheel.” A consortium would be far more powerful than each institution working on its own. WICS is one model such a consortium might use. Doubtless there are many others. The important thing is to work together toward a common good—toward devising the best ways to select and educate students so as to maximize their positive future impact. We wish our students to show wisdom. We need to do the same.

References

- Amabile, T. M. (1983). *The social psychology of creativity*. New York: Springer-Verlag.
- Amabile, T. M. (1996). *Creativity in context*. Boulder, CO: Westview.
- Andrews, F. M. (1975). Social and psychological factors which influence the creative process. In I. A. Taylor & J. W. Getzels (Eds.), *Perspectives in creativity* (pp. 117–145). Chicago: Aldine.
- Baltes, P. B. & Staudinger, U. (1993). The search for a psychology of wisdom. *Current Directions in Psychological Science*, 2, 75–80.
- Baltes, P. B. & Staudinger, U. (2000). Wisdom: A metaheuristic (pragmatic) to orchestrate mind and virtue toward excellence. *American Psychologist*, 55, 122–136.
- Barron, F. (1963). *Creativity and psychological health*. Princeton, NJ: D. Van Nostrand.
- Barron, F. (1969). *Creative person and creative process*. New York: Holt, Rinehart & Winston.
- Barron, F., & Harrington, D. M. (1981). Creativity, intelligence, and personality. *Annual Review of Psychology*, 32, 439–476.
- Birren, J. E., & Fisher, L. M. (1990). The elements of wisdom: Overview and integration. In R. J. Sternberg (Ed.), *Wisdom: Its nature, origins, and development* (pp. 317–332). New York: Cambridge University Press.
- Borman, W. C. (1991). Job behavior, performance, and effectiveness. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (2nd ed.) (Vol. 2, pp. 271–326). Palo Alto, CA: Consulting Psychologists Press, Inc.
- Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytic studies*. New York: Cambridge University Press.
- Clayton, V. (1975). Erickson's theory of human development as it applies to the aged: Wisdom as contradictory cognition. *Human Development*, 18, 119–128.
- Clayton, V. (1982). Wisdom and intelligence: The nature and function of knowledge in the later years. *International Journal of Aging and Development*, 15, 315–321.

- Colonia-Willner, R. (1998). Practical intelligence at work: Relationship between aging and cognitive efficiency among managers in a bank environment. *Psychology and Aging, 13*, 45-57.
- Cox, C. M. (1926). *The early mental traits of three hundred geniuses*. Stanford, CA: Stanford University Press.
- Csikszentmihalyi, M. (1988). Society, culture, and person: A systems view of creativity. In R. J. Sternberg (Ed.), *The nature of creativity* (pp. 325-339). New York: Cambridge University Press.
- Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.
- Eddy, A. S. (1988). The relationship between the Tacit Knowledge Inventory for Managers and the Armed Services Vocational Aptitude Battery. Unpublished master's thesis, St. Mary's University, San Antonio, TX.
- Flescher, I. (1963). Anxiety and achievement of intellectually gifted and creatively gifted children. *Journal of Psychology, 56*, 251-268.
- Fox, S., & Spector, P. E. (2000). Relations of emotional intelligence, practical intelligence, general intelligence, and trait affectivity with interview outcomes: It's not all just 'G'. *Journal of Organizational Behavior, 21*, 203-220.
- Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.
- Gardner, H. (1993a). *Creating minds: An anatomy of creativity seen through the lives of Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Gandhi*. New York: HarperCollins.
- Gardner, H. (1993b). *Multiple intelligences: The theory in practice*. New York: Basic Books.
- Gardner, H. (1999). *Intelligence reframed*. New York: Basic Books.
- Getzels, J. W., & Jackson, P. W. (1962). *Creativity and intelligence: Explorations with gifted students*. New York: John Wiley & Sons.
- Grigorenko, E. L., Meier, E., Lipka, J., Mohatt, G., Yanez, E., & Sternberg, R. J. (2004). Academic and practical intelligence: A case study of the Yup'ik in Alaska. *Learning and Individual Differences, 14*, 183-207.

- Gruber, H. E., and Davis, S. N. (1988). Inching our way up Mount Olympus: The evolving-systems approach to creative thinking. In R. J. Sternberg (Ed.), *The nature of creativity* (pp. 243-270). New York: Cambridge University Press.
- Guilford, J. P. (1950). Creativity. *American Psychologist*, 5, 444–454.
- Guilford, J. P. (1967). *The nature of human intelligence*. New York: McGraw-Hill.
- Hedlund, J., Forsythe, G. B., Horvath, J. A., Williams, W. M., Snook, S., & Sternberg, R. J. (2003). Identifying and assessing tacit knowledge: Understanding the practical intelligence of military leaders. *Leadership Quarterly*, 14, 117–140.
- Herr, E. L., Moore, G. D., & Hasen, J. S. (1965). Creativity, intelligence, and values: A study of relationships. *Exceptional Children*, 32, 114– 115.
- Holliday, S.G., & Chandler, M. J. (1986). *Wisdom: Explorations in adult competence*. Basel, Switzerland: Karger.
- Hunter, J. E. (1986). Cognitive ability, cognitive aptitudes, job knowledge, and job performance. *Journal of Vocational Behavior*, 29, 340-362.
- Jensen, A. R. (1998). *The g factor*. Westport: Praeger-Greenwood.
- Kitchener, K. S., & Brenner, H. G. (1990). Wisdom and reflective judgment: Knowing in the face of uncertainty. In R. J. Sternberg (Ed.), *Wisdom: Its Nature, origins, and development* (pp. 212–229). New York: Cambridge University Press.
- Kramer, D. A. (1990). Conceptualizing wisdom: The primacy of affect–cognition relations. In R. J. Sternberg (Ed.), *Wisdom: Its nature, origins, and development* (pp. 279–313). New York: Cambridge University Press.
- Labouvie-Vief, G. (1990). Wisdom as integrated thought: Historical and developmental perspectives. In R. J. Sternberg (Ed.), *Wisdom: Its Nature, origins, and development* (pp. 52–83). New York: Cambridge University Press.
- Lubart, T. I. (1994). Creativity. In R. J. Sternberg (Ed.), *Thinking and problem solving* (pp. 290– 332). San Diego: Academic Press.

- McCloy, R. A., Campbell, J. P., & Cudneck, R. (1994). A confirmatory test of a model of performance determinants. *Journal of Applied Psychology, 79*, 493-505.
- McNemar, Q. (1964). Lost: Our intelligence? Why? *American Psychologist, 19*, 871–882.
- Mednick, S. A. (1962). The associative basis of the creative process. *Psychological Review, 69*, 220–232.
- Mednick, M. T., & Andrews, F. M. (1967). Creative thinking and level of intelligence. *Journal of Creative Behavior, 1*, 428–431 .
- Piaget, J. (1972). *The psychology of intelligence*. Totowa, NJ: Littlefield-Adams
- Pulakos, E. D., Schmitt, N., & Chan, D. (1996). Models of job performance ratings: An examination of rater race, rater gender, and rater level effects. *Human Performance, 9*, 103-119.
- Ree, M. J. & Earles, J. A. (1993). *g* is to psychology what carbon is to chemistry: A reply to Sternberg and Wagner, McClelland, and Calfee. *Current Directions in Psychological Science, 1*, 11-12.
- Renzulli, J. S. (1986). The three-ring conception of giftedness: a developmental model for creative productivity. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (pp. 53–92). New York: Cambridge University Press.
- Reznitskaya, A., & Sternberg, R. J. (2004). Teaching students to make wise judgments: The “teaching for wisdom” program. In P. A. Linley, & S. Joseph (Eds.) *Positive psychology in practice* (pp. 181-196). New York: Wiley.
- Robinson, D. N. (1990). Wisdom through the ages. In R.J. Sternberg (Ed.), *Wisdom: Its nature, origins, and development* (pp. 13-24). New York: Cambridge University Press
- Roe, A. (1952). *The making of a scientist*. New York: Dodd, Mead.
- Roe, A. (1972). Patterns of productivity of scientists. *Science, 176*, 940–941 .
- Schmidt, F. L., & Hunter, J. E. (1998). The validity and utility of selection methods in personnel psychology: Practical and theoretical implications of 85 years of research findings. *Psychological Bulletin, 124*, 262-274.

- Schmidt, F. L., Hunter, J.E., & Outerbridge, A. N. (1986). The impact of job experience and ability on job knowledge, work sample performance, and supervisory ratings of job performance. *Journal of Applied Psychology, 71*, 432-439.
- Simonton, D. K. (1984). *Genius, creativity, and leadership*. Cambridge, MA: Harvard University Press.
- Simonton, D. K. (1994). *Greatness: Who makes history and why?* New York: Guilford.
- Spearman, C. E. (1904). "General intelligence" objectively determined and measured. *American Journal of Psychology, 15*, 201-293.
- 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.
- Sternberg, R. J. (Ed.) (1990) *Wisdom: Its nature, origins, and development*. New York: Cambridge University Press
- Sternberg, R. J. (1996). For whom does the Bell Curve toll? It tolls for you. *Journal of Quality Learning, 6*(1), 9-27.
- Sternberg, R. J. (1997). *Successful intelligence*. New York: Plume.
- Sternberg, R. J. (1998a). Abilities are forms of developing expertise. *Educational Researcher, 27*(3), 11-20.
- Sternberg, R. J. (1998b). A balance theory of wisdom. *Review of General Psychology, 2*, 347-365.
- Sternberg, R. J. (1999). The theory of successful intelligence. *Review of General Psychology, 3*, 292-316.
- Sternberg, R. J. (2001). Why schools should teach for wisdom: The balance theory of wisdom in educational settings. *Educational Psychologist, 36*(4), 227-245.
- Sternberg, R. J. (2002). Smart people are not stupid, but they sure can be foolish: The imbalance theory of foolishness. In R. J. Sternberg (Ed.), *Why smart people can be so stupid* (pp. 232-242). New Haven: Yale University Press.
- Sternberg, R. J. (2003). *Wisdom, intelligence, and creativity synthesized*. New York: Cambridge University Press.

- Sternberg, R. J. (2005). WICS: A model of leadership. *The Psychologist-Manager Journal*, 8(1), 29–43.
- Sternberg, R. J. (2007). Finding students who are wise, practical, and creative. *The Chronicle of Higher Education*, 53 (44), B11.
- Sternberg, R. J. (2008a). Assessing what matters. *Educational Leadership*, 65 (4), 20-26.
- Sternberg, R. J. (2008b). The WICS approach to leadership: Stories of leadership and the structures and processes that support them. *The Leadership Quarterly*, 19 (3), 360-371.
- Sternberg, R. J., & Detterman, D. K. (Eds.) (1986). *What is intelligence?* Norwood, N.J.: Ablex Publishing Corporation.
- Sternberg, R. J., Forsythe, G. B., Hedlund, J., Horvath, J. A., Wagner, R. K., Williams, W. M., Snook, S., & Grigorenko, E. L. (2000). *Practical intelligence in everyday life*. New York: Cambridge University Press.
- Sternberg, R. J., & Grigorenko, E. L. (1999). Myths in psychology and education regarding the gene-environment debate. *Teachers College Record*, 100, 536–553.
- Sternberg, R. J., & Grigorenko, E. L. (2004). WICS: A model for selecting students for nationally competitive scholarships. In A. S. Ilchman, W. F. Ilchman, and M. H. Tolar (Eds.), *The lucky few and the worthy many. Scholarship competitions and the world's future leaders* (pp. 32–61). Bloomington, IN: Indiana University Press.
- Sternberg, R. J., & Grigorenko, E. L. (2007). *Teaching for successful intelligence* (2nd ed.). Thousand Oaks, CA: Corwin Press
- Sternberg, R. J., Jarvin, L., & Grigorenko, E. L. (in press). *Teaching for wisdom, intelligence, and creativity*. Thousand Oaks, CA: Corwin.
- Sternberg, R. J. & Jordan, J. (Eds.) (2005) *Handbook of wisdom: Psychological perspectives*. New York: Cambridge University Press
- Sternberg, R. J., & Lubart, T. I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity*. New York: Free Press.
- Sternberg, R. J., & Lubart, T. I. (1996). Investing in creativity. *American Psychologist*, 51(7), 677–688.

- Sternberg, R. J., Nokes, K., Geissler, P. W., Prince, R., Okatcha, F., Bundy, D. A., & Grigorenko, E. L. (2001). The relationship between academic and practical intelligence: A case study in Kenya. *Intelligence, 29*, 401–418.
- Sternberg, R. J., & The Rainbow Project Collaborators (2006). The Rainbow Project: Enhancing the SAT through assessments of analytical, practical and creative skills. *Intelligence, 34* (4), 321-350.
- Sternberg, R. J., Reznitskaya, A. & Jarvin, L. (2007). Teaching for wisdom: What matters is not just what students know, but how they use it. *The London Review of Education, 5* (2), 143-158.
- Sternberg, R. J., & Williams, W. M. (1996). *How to develop student creativity*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Terman, L. M. (1950). *Concept Mastery Test*. New York: Psychological Corporation.
- Torrance, E. P. (1962). *Guiding creative talent*. Englewood Cliffs, NJ: Prentice-Hall.
- Torrance, E. P. (1974). *Torrance tests of creative thinking*. Lexington, MA: Personnel Press.
- Wagner, R. K. (1987). Tacit knowledge in everyday intelligent behavior. *Journal of Personality and Social Psychology, 52*, 1236-1247.
- Wagner, R. K., & Sternberg, R. J. (1985). Practical intelligence in real-world pursuits: The role of tacit knowledge. *Journal of Personality and Social Psychology, 49*, 436-458.
- Wagner, R. K., & Sternberg, R. J. (1990). Street smarts. In K. E. Clark & M. B. Clark (Eds.), *Measures of leadership* (pp. 493-504). West Orange, NJ: Leadership Library of America.
- Wagner, R. K., & Sternberg, R. J. (1991). *Tacit Knowledge Inventory for Managers*. San Antonio, TX: The Psychological Corporation.
- Wagner, R. K., Sujan, H., Sujan, M., Rashotte, C. A. & Sternberg, R. J. (1999). Tacit knowledge in sales. In R. J. Sternberg & J. A. Horvath (Eds.), *Tacit knowledge in professional practice* (pp. 155-182). Mahwah, NJ: Lawrence Erlbaum Associates.
- Wallach, M., & Kogan, N. (1965). *Modes of thinking in young children*. New York: Holt, Rinehart, & Winston.

Yamamoto, K. (1964). Creativity and sociometric choice among adolescents. *Journal of Social Psychology, 64*, 249–261.