Identifying Gifted Students in the New Millennium

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Abstract

Many of the instruments we use in identifying gifted students are relics of the 20th century. Indeed, they are derivatives of a test first published by Binet and Simon in 1905, more than a century ago. If our technologies in word processing and computing had progressed at this rate, we would still be doing all our report-writing with a fountain pen and doing all our calculations by hand. In order to adapt successfully to a rapidly changing world, people need the creative skills to develop new ideas and to cope with novelty and diversity; the analytical skills to ascertain whether their new ideas are good ones; the practical skills to execute their ideas and to ensure they are for a common good; and the wisdom-based skills to ensure the ideas represent a common good, over the long and short terms, through the infusion of ethical values. In this chapter, I describe assessments we have developed, for students of roughly 10-25 years of age, to measure these skills. I also present data validating these assessments, and discuss their implications for identification worldwide. I show it is possible both to improve academic prediction and to increase diversity across ethnic and other groups using such instruments.

My freshman-year introductory psychology course was designed like most courses, not only in college, but from middle school onward. The main means of teaching was lecture and the main assessment of performance was a set of tests that measured our recall and basic understanding of the facts taught in the course. I got a C. My professor commented to me that "There is a famous Sternberg in psychology and it looks like there won't be another one." I got discouraged, left psychology, and came back only when I was failing my introductory course for math majors, and decided a C was better than an F.

Thirty-five years later, I became President of the American Psychological Association, which, with a membership of 155,000, is the largest professional organization of psychologists in the world. In some ways, it is the best position one can get in the field of psychology. I cracked to my predecessor as President that it was ironic that I, who had gotten a C in my intro course, was now President of the association. He looked me straight in the eye and admitted that he, too, had gotten a C.

This vignette points out in microcosm what perhaps is wrong with the assessments to which we have committed ourselves. As a teacher or administrator, how many times have you had to take a multiple-choice or fill-in-the blanks test, except for, perhaps, when you needed to take a test to show you were supposedly qualified for the job? When I look at the skills and concepts I have needed to succeed in my own field, there are a number of them that are crucial: creativity, common sense, wisdom, ethics, dedication, honesty, teamwork, hard work, how to win and how to lose, a sense of fair play, and lifelong learning. But memorizing books is certainly not one of them.

One can argue, with justification, that one cannot think without content to think with and about. This is indisputable. But when we teach only for facts, rather than for how to go beyond facts, we teach children how to get out of date. For example, the facts that I learned in my introductory-psychology course matter little today. An introductory text contains almost entirely different facts. I know: I am the author of one of those textbooks (Sternberg, 2004)! Other fields, such as the hard sciences, political science, economics, and so forth, change at least as rapidly. Even the humanities change: There is a set of classic works that remains, but the interpretations and even what constitutes such interpretations changes.

So what should we assess? We should assess what students need to be active and engaged citizens of the world in which they will live—in a sense, what it takes to be "expert" citizens. Oddly enough, there are a lot of models for how we can prepare students for the roles they will play in their world. Traditional schooling just does not happen to be one of them. We should also assess in ways that can help students develop the skills they need for success in school and life.

Consider students on an athletic team. They learn declarative knowledge about the sport. But learning, say, the rules of the game will help them no more in playing the game than memorizing a book of rules on driving will help someone drive. They need also to learn how to play the sport. But the most important skills they learn have nothing to with one sport or another. They are very much like the skills I mentioned above, such as dedication, honesty, teamwork, common sense, and the wisdom to distinguish right from wrong. These are skills that will, or at least should, forever stay with and serve in good stead the team players who learn them. Athletics is not the only model for such learning.

Consider the members of an orchestra or of a dance ensemble. They, too, must learn to work together and must develop skills such as those described above.

How might assessments better reflect the kinds of skills that matter not just in school, but in life beyond school? This is a question that we in the Center for the Psychology of Abilities, Competencies, and Expertise, formerly at Yale and now at Tufts University, have set for ourselves, and a challenge we have taken as, to some extent, our life work.

ASSESSMENT FOR WICS

The model that underlies our assessments is called WICS, which is an acronym for *wisdom-intelligence-creativity, synthesized* (Sternberg, 2003). The basic idea underlying this model is that active and engaged citizenship, and especially leadership, require individuals (a) to have a creative vision for how they intend to make the world a better place, not just for them, but for their family, their friends, their colleagues, and others; (b) the analytical intellectual skills to be able to say whether their vision, and that of others, is a good vision; (c) the practical intellectual skills to be able to execute their vision and to persuade others of its value; and (d) the wisdom to ensure that their ideas represent a common good, not just their own interests or those of their friends and family. Can we apply this model to assessments that can be used in schools? We have done a variety of projects suggesting we can.

TEACHING AND ASSESSING FOR SUCCESSFUL INTELLIGENCE

Some of our earlier projects were based on the predecessor of the WICS model, the model of successful intelligence (Sternberg, 1997). The programs on which these projects were based were designed to determine whether we could teach and assess

students for memory, analytical, creative, and practical achievement in the context of any academic subject at any grade. At that point, wisdom was not separated from practical skills, although it can be distinguished. Wisdom involves using academic and practical intelligence, as well as creativity and knowledge, for a common good. A used-car salesman could be high in practical (or emotional) intelligence—he convinces customers to buy bad cars—without being wise.

As an example, in social studies, we might assess understanding of the Civil War by measuring basic knowledge about the Revolution, but also asking questions such as (a) Compare and contrast the Civil War and the American Revolution (*analytical*); (b) What might our country be like today if the Civil War had not taken place (*creative*); (c) How has the Civil War affected, even indirectly, the kinds of rights people have today (*practical*)? (d) Are wars ever justified (*wisdom*)?

In English, we might assess understanding of a novel such as *Tom Sawyer* by asking (a) How was the childhood of Tom Sawyer similar to and different from your own (*analytical*)? (b) Write an alternative ending to *Tom Sawyer* (*creative*); (c) What techniques did Tom Sawyer use to persuade his friends to whitewash Aunt Polly's fence (*practical*)? (d) Is it ever justified to use such techniques of persuasion to make people do things that they do not really want to do (*wisdom*)?

In science, we might ask (a) What is the evidence suggesting that global warming is taking place (*analytical*); (b) What do you think the world will be like in 200 years if global warming continues at its present rate (*creative*)? (c) What can you, personally, do to help slow down global warming (*practical*)? (d) What responsibility do we have, if

any, to future generations to act upon global warming now before it get much worse (*wisdom*)?

In mathematics, we might ask (a) What is the interest after six months on a loan of $4000 at 4% annually (*analytical*)? (b) Create a mathematical problem involving interest on a loan (*creative*); (c) How would you invest $4000 so as to maximize your rate of return without your being likely to risk more than 10% of the principal (*practical*)? (d) Why do states set maximum rates of interest that lenders can charge, and should they do so (*wisdom*)?

We have found, in studies of reading, social studies, science, and mathematics, at a variety of grade levels, that teaching for analytical, creative, and practical thinking, as well as for memory, boosts achievement on tests that measure achievement broadly, across subject-matter areas and grade levels (e.g., Grigorenko, Jarvin, & Sternberg, 2002; Sternberg, 1997; Sternberg, Grigorenko, Ferrari, & Clinkenbeard, 1999; Sternberg, Grigorenko, & Jarvin, 2001; Sternberg, Torff, & Grigorenko, 1998). Interestingly, even when students are assessed just for memory, they perform better when taught broadly than when taught just for memory. The reason is that such broader teaching enables students to capitalize on their strengths and to correct or compensate for their weaknesses in learning. It also enables students and teachers to see what the strengths and weaknesses are in the first place, so that students better can understand on which strengths to capitalize, and which weaknesses need to be compensated for or corrected.

ASSESSMENT PROJECTS BASED ON WICS

In our societies, a problem with teaching and assessing more broadly is that the kinds of standardized assessments we use are quite narrow. For example, the SAT

Reasoning and Subject tests used in the United States assess primarily remembered knowledge base and analytical skills applied to this knowledge. Creativity, practical thinking, and wisdom are assessed minimally or, more likely, not at all. Is there any hope that our societies can transport some of these ideas to high-stakes assessments?

THE RAINBOW PROJECT

My collaborators and I decided to find out. In one study, the Rainbow Project, we designed tests of creative and practical thinking that could be used to supplement tests such as the SAT Reasoning Test, which measures analytical skills in the verbal and mathematical domains, and is widely used in the United States for college admissions. We tested 1013 high school students and college freshmen from 15 different high schools and colleges. We gave them analytical questions much like those that are traditionally found on standardized tests. But we also asked them to answer creative and practical questions.

The creative tests required the students to stretch their imaginations. For example, they might be asked to write a creative story with a title such as *The Octopus's Sneakers* or *3821*. Or they might be shown a collage of pictures, such as of musicians or athletes, and be asked orally to tell a story based on the collage. Or they might be asked to caption an untitled cartoon. The practical tests required the students to solve everyday problems. Some of them were presented in verbal form, others, through movies. For example, students might see a movie showing a student about to ask a professor for a letter of recommendation, but also showing the blank look on the professor's face indicating that he did not know who the student was. The task would be to decide what

the student should do. Or they might see a movie with friends trying to figure out how to move a large bed up a winding staircase.

The results suggested that we need not limit ourselves to narrow assessments of critical reasoning skills. There were three critical findings of the study (Sternberg & the Rainbow Project Collaborators, 2006).

First, we discovered three factors underlying our tests. One was creative thinking, as predicted; a second factor we predicted was practical thinking. But the third factor, which we did not predict, was multiple-choice problem solving. In other words, multiple-choice tests, no matter what they were supposed to measure, clustered together: Students who were better at one multiple-choice tended to be better at others as well. This result suggested that merely using multiple-choice consistently tends to benefit some students and not others.

Second, we discovered that using broader tests for college admissions can enhance academic excellence. We doubled prediction of freshman-year grades over SAT alone. Compared with SAT and high school GPA, we still increased prediction by about 50%. In other words, our assessments were not quixotic ventures into esoteric realms. On the contrary, they enhanced our ability to predict who would be more versus less successful in college, at least, from an academic point of view.

Third, we discovered that we could substantially reduce ethnic-group differences on the tests. In other words, using such tests potentially would increase the proportion of ethnic-minorities admitted to selective colleges. In doing so, the tests not only would not compromise academic excellence, but actually enhance it. The reason was that different ethnic and other groups have different conceptions of what intelligence is (Sternberg,

2006), and so socialize their children to be intelligent in different ways. For example, on our tests, American Indians, on average, performed lower than most other groups on analytical assessments. But on oral storytelling, they had the highest average scores. Different groups excel, on average, in different ways, and giving them a chance to show how they excel gives them the opportunity to show that they can succeed, if only they are allowed to show how to succeed.

Tests such as the Rainbow Assessment do not benefit only members of ethnic minority groups. There are many students who come from the majority group, and even from well-off homes, who learn in ways that are different from those assessed by conventional standardized tests. These children may well have the abilities they need to succeed in life and even in school; but these abilities may not be reflected in scores on conventional tests. Our tests help identify such students.

It is one thing to have a successful research project, and another actually to implement the procedures in a high-stakes situation. We have had the opportunity to do so.

THE KALEIDOSCOPE PROJECT

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

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 WICS (Sternberg, 2007). The questions were optional in this experimental year. Whereas the Rainbow Project was done as a separate high-stakes test administered with a proctor, the Kaleidoscope Project was done as section of the Tufts-specific part of the college application. 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. The section was optional this past year, and students were encouraged to answer just a single question. As examples, a creative question asked students to write stories with titles such as "The End of MTV" or "Confessions of a Middle-School Bully." Another creative question asked students what the world would be like if some historical event had come out differently, for example, if Rosa Parks had given up her seat on the bus. Yet another creative question, a nonverbal one, gave students an opportunity to design a new product or an advertisement for a new product. A practical question queried how students had persuaded friends of an unpopular idea they held. A wisdom question asked students how a passion they had could be applied toward a common good.

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

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

We now have the results of our first year of implementation, and they are very promising. Some stakeholders were afraid that numbers of applications would go down; instead, they went up slightly. What was more notable was that the quality of applicants rose substantially. There were notably fewer students in what before had been the bottom third of the pool in terms of quality. Many of those students, seeing the new application, decided not to bother to apply. Other stakeholders were afraid average SATs would go down and perhaps even plummet. Instead, they went up. The reason is that the new assessments are not negatively correlated with SATs. Rather, they just are not much correlated at all, one way or another. So adopting these new methods does not result in less qualified applicants being admitted. Rather, the applicants who are admitted are *more* qualified, but in a broader way. Moreover, 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, we admitted 30% more African-American students than the year before, and 15% more Hispanic-Americans. 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 colleges. We have also found that students who excelled in the Kaleidoscope program did not differ significantly in their

first-year fall term 2007 grades from students admitted for other reasons, and that Kaleidoscope shows minimal correlations with academic college-entrance test scores (about .1), but correlates moderately highly (about .4) with ratings of leadership and extracurricular engagement. 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.

THE CHOATE ROSEMARY HALL AND UNIVERSITY OF MICHIGAN BUSINESS SCHOOL PROJECTS

Such projects can be done at any level. We designed an admissions test for a well known private secondary school, Choate Rosemary Hall, which showed results on a whole class that were comparable to those for the Rainbow Project. We also did a project in a large business school, and showed that we could increase prediction and decrease both sex and ethnic-group differences in admissions (Hedlund, Wilt, Nebel, Ashford, & Sternberg, 2006).

THE AURORA PROJECT

We are currently developing and norming a comparable test for middle-school students (Chart, Grigorenko, & Sternberg, 2008). The battery under current development comprises two parts, a newly designed, augmented part (Aurora-*a* or the Aurora *a*-battery) and a more conventional, intelligence-based part (Aurora-*g* or Aurora *g*-battery). Both are paper-and-pencil assessments intended for group administration to mainstreamed students at the elementary to middle school levels at which gifted programming is most prevalent. Thus, we use the test at roughly grades 4-8. The

augmented assessment is more substantial and is grounded in the theory of successful intelligence as presented earlier. The conventional assessment of general intellectual ability has been developed as a supplement. Of greatest importance and significance is the former, which, accordingly, we discuss more extensively here.

In designing the augmented assessment, we used a basic grid structure to depict graphically the broad range of item types to be developed. Analytical, creative, and practical domains are crossed with figural, verbal, and quantitative modes. Subtests are created such that their dominant properties fulfill the criteria of each cell of the grid. Resulting are nine different types of subtests that together assess each combination of domain and modal specificity. This design is implemented for three reasons: to anchor the assessment securely in the theory of successful intelligence, to allow students balanced opportunities to demonstrate multiple and varied abilities, and to serve as a clear guide for assessing abilities across and between domains and modes.

Augmented assessment items differ in ways beyond the categorical properties of the grid. Difficulty varies from subtest to subtest, and from item to item within these. A central goal of task creation is the elimination of ceilings on each subtest to the extent possible (and reasonable) without compromising the capacity of the assessment to be given not only to students already thought to be gifted but to whole student populations without generating undo distress or anxiety. Both subtests and tasks range in length and individual questions take many forms. Some items require receptive answers, those chosen from a discrete set of options, and others productive answers, generated by the student with varying degrees of constraint. Among other variations, there are multiple-choice and fill-in-the-blank questions to be answered, math problems to be solved, lists to

be generated, short selections to be written, pieces of information to be classified and ordered, money to be allocated, paths to be drawn, and subjective decisions to be made. A glance at the assessment reveals photographs, arrangements of numbers, drawings, short paragraphs, and computer generated images.

Consider some examples. *Floating Boats* allows students to match patterns of connected toys whose arrangement changes from one photograph to another. *Book Covers* allows students to generate a brief story plot to describe somewhat abstract pictures described as children's book covers. *Toy Shadows* allows students to choose the shadow that is made by a toy oriented in a particular way in relation to a light. *Strange Metaphors* allows students to generate a link between two somewhat unrelated nouns. *Inanimate Conversations* allows students to imagine what certain objects might say to each other if they could speak. *Tough Decisions* allows students to categorize given information in pro- or con- lists to make an everyday choice. *Letter Math* allows students to find numerical solutions to math problems with letters in place of some "missing" values. *Number Talk* allows students to explain the reason for a social interaction briefly described and illustrated between two cartoon numbers. *Logistics Mapping* allows students to compare different routes to destinations based on incremental distances provided. This selection offers a sample of the range of tasks developed for the augmented assessment.

As a supplement to the analytical, creative, and practical measures described above, a *g*-factor assessment has also been developed (the so-called Aurora-*g* battery). Its design is likewise guided by a grid structure with identical modes, but with task types rather than skill areas informing the second axis. These are analogy, series completion,

and classification tasks—all typical traditional measures of general intelligence. Analogy requires students to analyze a relationship between a pair of stimuli (images, words or numbers) and extend this relationship to a second, unfinished pair by choosing the correct stimulus from choices. Series completion requires students to evaluate the logic of a progressive series of stimuli (images, words or numbers) and choose the next stimulus in the series from choices. Finally, classification tasks require students to compare and contrast the properties of a list of stimuli (images, words or numbers) and select the one that conforms least to the others. Exactly nine subtests were developed such that the criteria of each cell of the design grid are met.

The two sections that make up the Aurora Battery are intended to complement each other by reserving a place for traditionally valued g-factor skills while expanding the scope of identification methods to recognize less formally appreciated creative and practical skills with the augmented assessment. The inclusion of both tests grants schools the ability to demonstrate the relative effectiveness of each for assessing the abilities valued in their stated definitions of giftedness and fostered through their programming. Educators are also given the opportunity to consider how the augmented assessment compares with a more traditional one in identifying students in the school's particular context without employing multiple test batteries. This single battery might therefore be uniquely applied in accordance with the needs and goals of particular schools. There is also a parent section that is under development.

THE ADVANCED PLACEMENT PROJECT

In a related project, we asked whether the same principles could be applied to high-stakes achievement testing. We modified Advanced Placement tests in Psychology

and Statistics additionally to assess analytical, creative, and practical skills. Here is an example in psychology:

A variety of explanations have been proposed to account for why people sleep.

a) Describe the Restorative Theory of sleep (*memory*).
b) An alternative theory is an evolutionary theory of sleep, sometimes referred to as the "Preservation and Protection" theory. Describe this theory and compare and contrast it with the Restorative Theory. State what you see as the two strong points and two weak points of this theory compared to the Restorative Theory (*analytical)*.
c) How might you design an experiment to test the Restorative Theory of sleep? Briefly describe the experiment, including the participants, materials, procedures, and design (*creative)*.
d) A friend informs you that she is having trouble sleeping. Based on your knowledge of sleep, what kinds of helpful (and health-promoting) suggestions might you giver her to help her fall asleep at night (*practical*)?

We found that by asking such questions, as in the other studies, we were able both to increase the range of skills we tested and substantially to reduce ethnic-group differences in test scores (Stemler, Grigorenko, Jarvin, & Sternberg, 2006).

CONCLUSION

The ways in which we assess student knowledge and skills have not changed much from what they were a century ago. Perhaps such assessments met the cognitive demands placed on students 100 years ago. They do not meet the cognitive demands of the world today. Active and engaged citizens must be able (a) to be creatively flexible,

responding to rapid changes in the environment; (b) to think critically about what they are told in the media, whether by newscasters, politicians, advertisers, scientists, or anyone else; (c) to execute their ideas and persuade others of their value; and most of all, (d) to display the wisdom to use their knowledge in ways that avoid the horrors of bad leadership, as we have seen in Enron, Arthur Anderson, Tyco, and innumerable other organizations. It is time to have assessments that reflect the demands of the current century. We have suggested how we might create and evaluate such assessments.

It may be a hard sell to administrators to teach and assess for wisdom. Yet, wisdom is the most important and yet most neglected aspect of education today (Sternberg, 2001a, 2001b). We have seen in failed leaders the enormous costs of leaders who are knowledgeable and intelligent—who have "good degrees" from prestigious schools—yet are unwise. They tend to be commit serious cognitive fallacies—(a) *unrealistic optimism*—believing that anything they do will turn out well because they are so brilliant; (b) *egocentric*—believing that the world does or should revolve around them; (c) *falsely omniscient*—failing to learn from experience because they believe they know everything; (d) *falsely omnipotent*—believing that they are all-powerful by virtue of their superior skills or education; (e) *falsely invulnerable*—believing they can get away with almost anything because they are so clever; and (f) *ethically disengaged*—believing that ethical principles apply only to lesser mortals. In my view, much of what is wrong in the world today stems from people who are, simultaneously, smart but foolish.

Four caveats are in order about the work described here. First, the assessments I have described are based on the WICS theory (Sternberg, 2003), which in turn is an extension of my theory of successful intelligence (Sternberg, 1997). This is not the only

broader theory on the basis of which new, broader assessments could be created. For example, Gardner's (1999) theory provides another basis for such assessments, and other theories could be used as well. Second, the assessments do not measure all of the skills required for success in everyday life. For example, although I assess teamwork in the courses I teach, the assessments I have described do not measure this skill, at least, not directly. Third, the assessments have not been scaled up to be used on a statewide or national basis. Doing so would no doubt present new challenges, some of which have yet to be anticipated. Fourth, expanded assessments cost more time and money. But when we consider the benefits of opening up possibilities and hope to diverse students who learn and think in a variety of different ways—of whatever gender or ethnic background—the costs actually may be relatively small. Our societies need citizens and leaders who are creative, practical, and especially, wise, not just those who are memorizers and who are analytically adept. Instruction and assessment are two sides of the same coin, rather than two different coins. Assessment drives instruction. So it is time to create assessments that are worthy of such a role.

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