

Flunking innovation and creativity

East Asia's highly touted test scores in math, science, and reading are masking important failures in developing innovators and entrepreneurs.

By Yong Zhao

"We have a wake-up call now about America's kids," announced a worried Diane Sawyer on "ABC World News" in December 2010.

Three weeks earlier, Sawyer had taken viewers to China to show them what she called "the ambition and energy of 1.3 billion people" competing for the American dream. "Today, the new international reading, math, and science scores were released, and Chinese students left American teens in the dust in all three categories," Sawyer said.

"In fact, these numbers are stunning for the entire world. Shanghai stunner, you could call it," said ABC reporter David Muir who accompanied Sawyer to China and further explained the significance of the scores. He pointed out that U.S. Secretary Arne Duncan labeled the scores a wake-up call for America and President Obama and tagged the occasion "a modern day Sputnik moment to catch up." The rest of the 3½-minute news clip featured stunning

YONG ZHAO (yongzhao@uoregon.edu) is presidential chair and associate dean for global education in the University of Oregon's College of Education, Eugene, Ore. This article is adapted from his book *World Class Learners: Educating Creative and Entrepreneurial Students* (Corwin, 2012).

graphics showing how American students trailed Shanghai and several Asian countries, plus footage of President John F. Kennedy talking about the Soviet's Sputnik, the first man-made satellite to orbit the earth, launched in 1957 (Sawyer, 2010).

Sawyer was referring to the most recent results of the Programme for International Student Assessment (PISA), an international assessment of 15-year-olds in mathematics, reading, and science. In the most recent round, 65 nations participated in the study, with China's Shanghai ranking No. 1 in all three categories and the United States coming out average or below average (OECD, 2010). The results received extensive media coverage in the United States, all emitting a sense of shock, urgency, and anxiety. For example, Shanghai's students posted an average reading score of 556, compared to 500 for U.S. students, and they achieved the highest scores in math, 600, which was 113 points higher than the average for U.S. students (Associated Press, 2010). Considering the size of the gap between American students and Shanghai students, this sense of urgency and anxiety seems warranted.

Why didn't China celebrate?

Shanghai's stunning performance shocked other countries,

Although products worth billions of dollars are made in China, they are not made by China.

too. For example, a recent report by Australia's Grattan Institute highlighted the extraordinary education achievement in Shanghai where "the average 15-year-old mathematics student is performing at a level two to three years, on average, above his or her counterpart in Australia, the U.S., the U.K., and EU21 countries" (Jensen, 2012, p. 7). Although China has been thought of as a country with excellent education for a while now, Shanghai's PISA scores officially sealed its position as a world leader. It has become an education giant, one of the best-performing education systems, and a target of envy and learning. Surpassing Shanghai has become a goal for many countries, suggests the title of Marc Tucker's recent book, *Surpassing Shanghai: An Agenda for American Education Built on the World's Leading Systems* (Harvard Education Press, 2011).

But China did not have a big party celebrating this apparently outstanding achievement, which is unusual for a country eager to affirm its rise on the global stage with massive media coverage of any achievement in international competition, such as the number of Olympic medals. In fact, there was very little national coverage of the PISA results by the state-run mainstream media. And whenever the PISA story is mentioned, it is often accompanied with cautionary notes about why this news is not worth celebrating.

Steve Jobs, among others, is one of the whys.

"China needs (Steve) Jobs," China's Premier Wen Jiabao told business leaders in Jiangshu during his tour of one of China's most developed provinces in December 2011. "We must have products like Apple's that can dominate the world's markets" (Zhang, 2011). Wen's comments reflect China's burning desire for innovative and entrepreneurial talents to transform its labor-intensive economy to one built on innovation and creativity.

Despite its astounding economic growth for more than two decades, China's economy remains labor-intensive rather than knowledge-intensive. According to a report of the Chinese National Statistics Bureau, only about 2,000 Chinese companies owned the patent for the core technology used in the products they produced in 2005; that number represents less than 0.003% of all Chinese companies in that year (Zhao & Wu, 2005). Merely 473 innovations from China were recognized by the world's leading patent offices outside China in 2008 versus 14,399 from the United States (Gupta & Wang, 2011). As a result, although products worth billions of dollars are made *in* China, they are not made *by* China. Furthermore, an economy built on cheap labor is very volatile in a world where many countries can offer cheap labor. Rising labor costs and the increasing value of its currency already have threatened China's status as the world's factory.

But China can't have a Steve Jobs unless it fundamentally reforms its education, according to one of the most influential Chinese-American technology gurus, who has dedicated himself to incubating young entrepreneurs in China. "The next Apple, the next Google will come, but probably not in China," said Kai-fu Lee, founder of Innovation Works, an investment company aimed at cultivating innovative entrepreneurship in China. Lee was former founding president of Google China and former vice president of Interactive Services of Microsoft after working at Apple as a research and development executive (Caijing, 2010).

PISA scores in reading, math, and sciences are negatively correlated with entrepreneurship indicators in almost every category at statistically significant levels.

"At least not in the next 50 years or 100 years, there will not be an Apple or Google in China," Lee said in a controversial prediction at the World Economic Forum's Summer Davos in Tianjin, China, in September 2010. Lee migrated from Taiwan to the U.S. at 11 and received his undergraduate education at Columbia and earned a Ph.D. from Carnegie Mellon University. "If China wants this (to have an Apple or Google), it must rebuild its education system," Lee said.

The same in Singapore

Why is such an "excellent education system" held responsible for China's failure to produce a Steve Jobs? Why would the Chinese want to blow it up if it is as outstanding as its PISA performance suggests it is? Apparently, there is a mismatch of understanding of educational excellence.

The mismatch goes beyond China. Around the same time that China's Wen Jiabao said his country needs Steve Jobs, the iconic entrepreneur and the company he cofounded incited a discussion about creativity and entrepreneurship in another Asian country that has been viewed by outsiders to have the best education. In 2011, Steve Wozniak, who founded Apple with Jobs, said during an interview that a company like Apple could not emerge in structured countries like Singapore:

When you're very structured almost like a religion . . . Uniforms, uniforms, uniforms . . . everybody is the same. Look at structured societies like Singapore where bad behavior isn't tolerated. You are extremely punished. Where are the creative people? Where

are the great artists? Where are the great musicians? Where are the great singers? Where are the great writers? Where are the athletes? All the creative elements seem to disappear. (BBC, 2011)

Educational practices and societal factors that help students achieve academically may hamper entrepreneurial qualities and reduce creativity.

Wozniak's comments quickly got the attention of Singaporeans, who have been working hard at promoting creativity and entrepreneurship. Although some disagreed with Wozniak's assessment, the overall reaction was that he told the truth. Singaporean entrepreneur Willis Wee wrote, "I'm not sure how much Wozniak knows about Singapore and its system. But as a Singaporean, who grew up in this tiny island, I have to agree with his words" (Wee, 2011).

In a CNN article, Singaporean journalist Alexis Ong concurred. "At first glance, it made the small pseudo-patriot in me annoyed, but for the most part, the great and mighty Woz speaks the truth," she said, adding that the culprit is Singapore's education system. "Wozniak's comments are really a scathing indictment of the Singapore education system, its strictly regimented curriculum and by-rote study techniques that sustain the city's formal culture," said Ong. Everybody is educated in Singapore, she added. "But clearly the Singaporean education isn't the kind of education that gives rise to the people like Sergey Brin and Mark Zuckerberg . . . In Singapore, where children are streamed into different academic tracks and under pressure to get into a reputable school before the age of 12, the push to conform is enormous" (Ong, 2012).

But outsiders believe Singapore has an excellent education system. Outsiders have envied and admired Singapore for its consistently high performance on international tests. Since the early 1990s, Singapore has ranked in the top five in the Trends in International Mathematics and Science Study (TIMSS). In the most recent PISA, Singapore took second place in math, fourth place in sciences, and fifth in reading. Here again is a case of contradiction — an education giant that has trouble producing the creative and entrepreneurial talents it needs.

Achievement gap vs. entrepreneurship gap

This contradiction exists in other high-performing countries as well. Korea and Japan have consistently produced outstanding scores in international

tests. In the most recent PISA administered in 2009, Korea ranked fourth in math, sixth in sciences, and second in reading, while Japan was ninth in math, fifth in sciences, and eighth in reading. Nonetheless, these countries have not traditionally shown a level of creativity and innovation-driven entrepreneurship that matched their test scores. According to the 2010 Global Entrepreneurship Monitor (GEM) report (Kelley, Bosma, & Amorós, 2010), Korea and Japan were at the bottom of the list of 22 innovation-oriented developed nations, taking 19th and 21st place respectively in terms of "nascent entrepreneurship rate," which is defined as the percentage of people actively engaged in early stage entrepreneurial activities. (China and Singapore weren't included in the GEM study.)

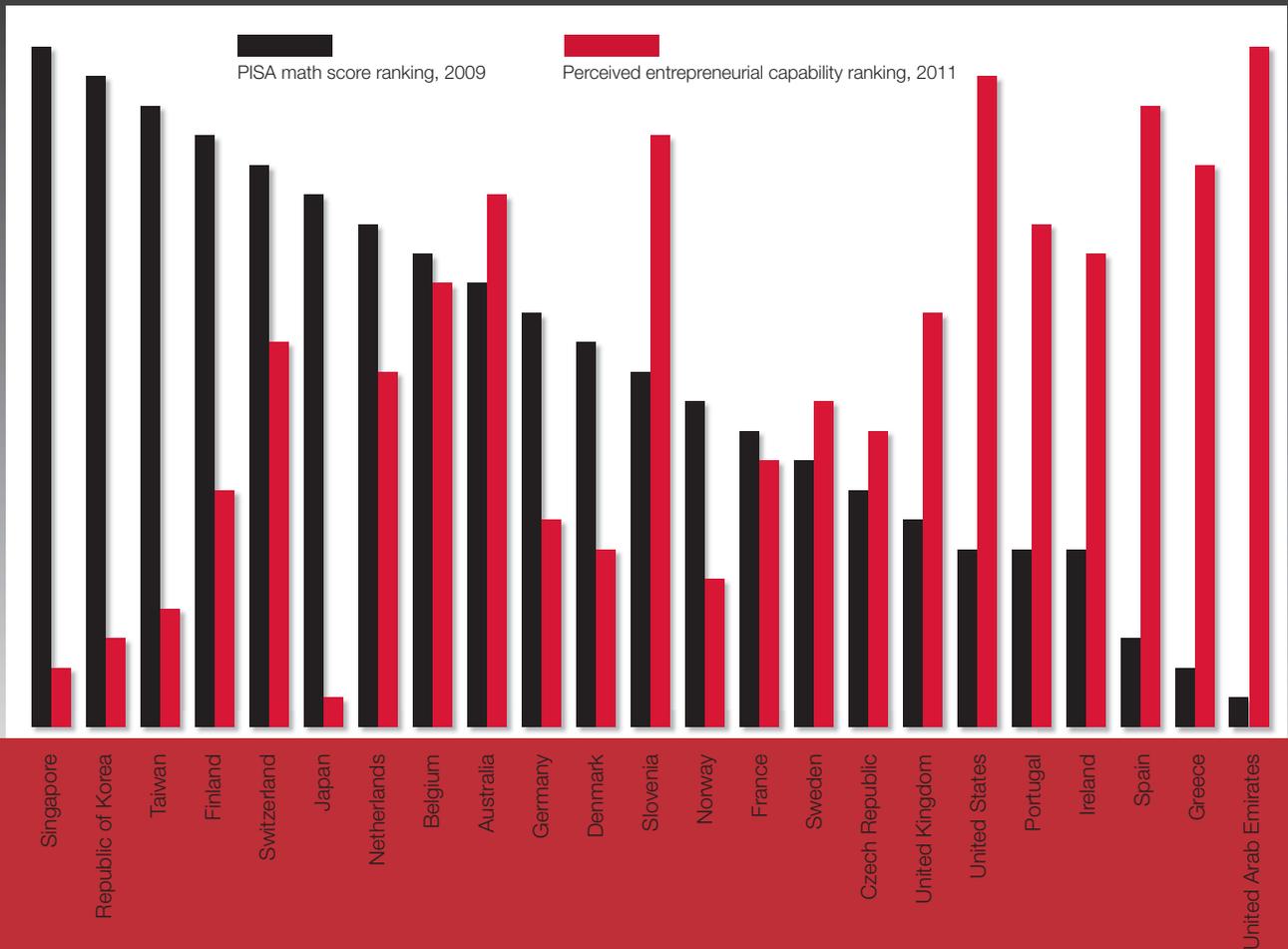
That GEM report also said Korea ranked seventh and Japan 21st in the percentage of individuals who started and are still managing a business. An even more telling figure is that less than half of all the early entrepreneurship activities in Korea and Japan were driven by opportunity and improvement, the rest were driven by necessity. In this category, Korea ranked 16th and Japan 18th.

The contradictory relationship between test scores and entrepreneurship activities is further affirmed by a comparison of PISA performance along with the entrepreneurship activities of nations. PISA scores in reading, math, and sciences are negatively correlated with entrepreneurship indicators in almost every category at statistically significant levels. In other words, countries with higher PISA scores have lower entrepreneurship activities. Specifically, countries with better performance on PISA tend to have fewer people who plan to start businesses and fewer people who have started new businesses.

The inverse relationship between PISA scores — often perceived as the measure of a nation's education quality and its students' academic abilities — and entrepreneurship activities seems to affirm the contradiction exemplified by Singapore and China. This means that the commonly used measures of educational quality have negative or no relationships with entrepreneurship.

The level of entrepreneurial activities in a nation is affected by many factors, but one of the most important factors is the percentage of individuals with entrepreneurial qualities because these are the individuals who undertake entrepreneurship activities. And one of the most significant elements of entrepreneurial qualities is perceived entrepreneurial capabilities — that is, an individual's confidence in his or her ability to succeed in entrepreneurship. Research suggests high-performing countries in international tests show a low level of perceived entrepreneurial capabilities (Zhao, 2012). For example, high-scoring

FIG 1.
Ranking by PISA math scores v. GEM Survey of Perceived Entrepreneurial Capability



Data source: Bosma, Wennekers, & Amorós, 2012; OECD, 2010.

countries on the PISA and TIMSS such as Singapore, Japan, Korea, and Taiwan scored much lower than Australia, the United Kingdom, and the United States in the category of perceived entrepreneurship capabilities of the GEM survey in 2011 (Bosma, Wennekers, & Amorós, 2012). Figure 1 shows the ranking of 23 countries and regions that participated in both the 2009 PISA math and 2011 GEM entrepreneurial capabilities. All 23 countries and regions are considered developed economies and thus are categorized as “innovation-driven economies” by the GEM study.

As Figure 1 shows, countries that scored higher in the 2009 PISA had lower scores in perceived entrepreneurial capabilities. Japan, Singapore, Korea, and Taiwan, among the top six on the PISA math score league table, are the lowest in terms of entrepreneurial capabilities, while the lowest ranked countries in PISA such as the United Arab Emirates, the United States, and Spain have the

highest entrepreneurial capabilities. This inverse relationship is confirmed by a correlational analysis, which shows significant negative correlation between PISA scores and entrepreneurial capabilities across countries (Zhao, 2012).

Interpreting the gaps

From China and Singapore’s blame of their supposedly excellent education for their inability to produce creative and entrepreneurial talents like Steve Jobs to the overall negative relationship between PISA scores and entrepreneurial capabilities, it seems reasonable to question the value and consequently the significance of educational excellence measured by international assessments such as the PISA. Entrepreneurship is directly related to economic prosperity and success. Thus, there should be little doubt that entrepreneurial capabilities may be a more worthwhile indicator than test scores. Even if we assume no causal relationship between the PISA

and entrepreneurial activities and capabilities, the gap in PISA test scores may not warrant the level of anxiety and concern expressed by policy makers, the media, and the public.

But there is another possibility that should worry us: If the Chinese and Singaporeans are correct to blame their education for their shortage of creative and entrepreneurial talents, then the relationship between PISA scores and entrepreneurial capabilities and activities indeed could be causal. That would mean that pursuing academic achievement may come at the cost of entrepreneurial qualities. In other words, the educational practices and societal factors that help students achieve academically may hamper entrepreneurial qualities and reduce creativity. Standardized, narrow, and uniform educational experiences, high-stakes standardized testing, a push for conformity, and intolerance of exceptional talents are among the factors identified in China and Singapore's education system for destroying the nations' creativity and entrepreneurial spirits.

Implications

The world needs more creators, innovators, makers, and entrepreneurs. Numerous international organizations have produced reports about the importance of entrepreneurship and issued calls for countries to develop entrepreneurship (Schoof, 2006; World Economic Forum, 2011) because "innovation and entrepreneurship provide a way forward for solving the global challenges of the 21st century, building sustainable development, creating jobs, generating renewed economic growth, and advancing human welfare" (World Economic Forum, 2009, p. 7). In the U.S., the Obama administration launched a \$2 billion entrepreneurship initiative in 2011, which includes a significant piece for youth entrepreneurship education because, as President Obama said, "entrepreneurs are the engine of job creation in America, generating millions of good jobs" (2009). There is also an increasing call for adding entrepreneurship education to all school curriculum (Aspen Youth Entrepreneurship Strategy Group, 2008).

But, unfortunately, America is becoming more like Asia. American reformers have been steadily transforming schools into education environments hostile to creative and entrepreneurial talents. In an effort to close the achievement gap in test scores through measures such as No Child Left Behind, the U.S. has added a strong Asian flavor to its schools characterized by centralized standardized curriculum and high-stakes standardized testing. It is continuing down the same path with more rigor and force with the Common Core standards initiative and Race to the Top. Already, America has seen a significant narrowing of curricula (McMurrer, 2008)

and a drastic shift toward teaching to the test (Nichols & Berliner, 2007). Coincidentally, America also saw a significant decline in creativity in the last few decades, as *Newsweek* reported in 2010 (Bronson & Merryman, 2010).

If America wants to continue its tradition of innovation and entrepreneurship, if President Obama is serious about out-innovating others and encouraging entrepreneurship, we must stop policies and practices that can harm creativity and entrepreneurship. This means attempts to narrow a child's educational experiences, to deprive children of opportunities to explore their interests and passions, or to label children incompetent or at risk just because they don't perform well on standardized tests. This also means any attempt to standardize and homogenize school experiences by forcing all teachers to teach the same thing at the same time for all children through test-based accountability measures for teachers and school leaders. Essentially, stop NCLB, stop the Common Core, and stop Race to the Top!

Of course, the most desirable situation is not just stopping efforts that can do harm, but developing an education that enhances human curiosity and creativity, encourages risk taking, and cultivates the entrepreneurial spirit in the context of globalization. Such an education requires a significant shift in our mindset about education from employment-oriented to entrepreneurship-oriented. An entrepreneurship-oriented education affords children autonomy, voice, and choice in what they learn, engages children in creating and making works that matter, and provides the learning in a global context. **K**

References

- Aspen Youth Entrepreneurship Strategy Group. (2008). *Youth entrepreneurship education in America: A policy maker's action guide*. Washington, DC: Aspen Institute.
- Associated Press. (2010, December 7). In ranking, U.S. students trail global leaders. *USA Today*.
- BBC. (2011, Jan. 20). Steve Wozniak: "Think for yourself." www.bbc.co.uk
- Bosma, N., Wennekers, S., & Amorós, J. (2012). *Global entrepreneurship monitor: 2011 extended report: Entrepreneurs and entrepreneurial employees across the globe*. London, England: Global Entrepreneurship Research Association.
- Bronson, P. & Merryman, A. (2010, July 10). The creativity crisis. *Newsweek*.
- Caijing. (2010). Kai-fu Lee: The next Apple will not be invented in China (translated). www.caijing.com.cn

- Gupta, A. & Wang, H. (2011, July 28). Chinese innovation is a paper tiger. *The Wall Street Journal*.
- Jensen, B. (2012). *Catching up: Learning from the best school systems in East Asia*. Melbourne, Australia: Grattan Institute.
- Kelley, D., Bosma, N., & Amorós, J. (2010). *Global entrepreneurship monitor*. London, England: Global Entrepreneurship Research Association.
- McMurrer, J. (2008). *Instructional time in elementary schools: A closer look at changes for specific subjects*. Washington, DC: Center on Education Policy.
- Nichols, S. & Berliner, D. (2007). *Collateral damage: How high-stakes testing corrupts America's schools*. Cambridge, MA: Harvard Education Press.
- Obama, B. (2009, March 10). President Obama's remarks to the Hispanic Chamber of Commerce. *The New York Times*.
- OECD. (2010). *PISA 2009 results*. Paris, France: Author.
- Ong, A. (2012, January 10). Singapore needs to encourage "bad behavior." CNN. www.cnn.com
- Sawyer, D. (2010, December 7). China beats U.S. in reading, math, and science. ABC News. abcnews.go.com
- Schoof, U. (2006). *Stimulating youth entrepreneurship: Barriers and incentives to enterprise start-ups by young people*. Geneva, Switzerland: International Labor Organization.
- Wee, W. (2011, December 15). Apple co-founder Steve Wozniak questions Singapore's creativity. *Tech in Asia*. www.techinasia.com/wozniak-questions-singapore-creativity/
- World Economic Forum. (2009). *Educating the next wave of entrepreneurs: Unlocking entrepreneurial capabilities to meet the global challenges of the 21st century*. Geneva, Switzerland: Author.
- World Economic Forum. (2011). *Unlocking entrepreneur capabilities to meet the global challenges of the 21st century: Final report on the entrepreneurship education work stream*. Geneva, Switzerland: Author.
- Zhang, S. (2011, December 21). Wen Jiabao: Zhongguo yao you qiaobusi (Wen Jiabao: China needs jobs). *China Daily*.
- Zhao, X. & Wu, Q. (2005, December 20). End-of-year report: China to strengthen protection of intellectual properties and encourage domestic innovation. *Xinhua News Service*.
- Zhao, Y. (2012). *World class learners: Educating creative and entrepreneurial students*. Thousand Oaks, CA: Corwin Press.

Stanford University School of Education

Director of Leadership Degree Programs

The Stanford University School of Education (SUSE) seeks a qualified candidate to be the Director of Leadership Degree Programs (LDP). This is an open-rank parents (teaching) position and a voting academic council member. The position is reviewed for advancement and renewal every five years.

The position entails two roles: one as a researcher/teacher and another as director. The faculty member is expected to teach two courses a year, in addition to weekly master's seminars; oversee the Policy, Organization, Leadership Studies (POLS) MA and Joint MA/MBA programs that serve 60-70 graduate students every year; and provide service to the School and University.

As Director, the faculty member oversees the recruitment and admissions process, and directs and contributes to the academic and extra-curricular experiences for students in both programs. The director helps create a collaborative culture between the two programs and provides feedback across the School: with other faculty, Academic Services, Career Services, Alumni Relations, and External Relations so as to inform program planning and create a seamless experience

for participating students. The Director also serves as a liaison with organizations throughout the University, especially the Graduate School of Business (and MBA Admissions Office) to establish communication systems between the two schools and design innovative outreach efforts.

For qualifications required as well as contact information for the search committee, please visit <http://ed.stanford.edu/faculty/jobs>.

To apply, please visit <https://academicjobsonline.org/ajo/jobs/1564>.

Stanford University is an equal opportunity employer and is committed to increasing the diversity of its faculty. It welcomes nominations of and applications from women and members of minority groups, as well as others who would bring additional dimensions to the university's research, teaching and clinical missions.

