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## *Reflections*

*Everything always  
bears looking into,  
astonishing as  
that fact is.*

Marilynne Robinson,  
*The Death of Adam* (1998)

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Fall 2012  
Vol. 86, No. 1

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# Can We Drive Innovation If Creativity Is in Crisis?

*A new look at creativity research suggests that education needs the arts to stimulate innovation.*

**By Jan Mirenda Smith**



## About the Author

Jan Mirenda Smith's plans for medical school were set aside in favor of following the love of art she had enjoyed since childhood, growing up in a home that fostered creativity. Her school essays were illustrated—even written on parchment with burned edges in the case of a history paper. With an MA in Fine Arts from the University of Wisconsin-Milwaukee, and a Certificate in Museum Studies, she has enjoyed twenty-five years in the museum profession, currently serving as Executive Director of the Bergstrom-Mahler Museum in Neenah, Wisconsin. With a son just finishing a degree at Boston University's Opera Institute, she and her husband Scott have joined the Fox Valley Torch Club to indulge in their passion for learning.

Presented to the Fox Valley Torch Club on May 11, 2011.

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Funding for arts and art education has been questioned in economic legislation and reform as the global economy is challenged. This paper explores the importance of art and creative thinking in partnership with today's business, exploring whether their fueling of business initiatives and innovation might make the creative arts fundamental to educational reform and change—what business interests in the United Kingdom have defined as the “commercial application and successful exploitation of an idea.”<sup>1</sup>

## A Creativity Crisis in Education

The humanities and the arts offer the best opportunity for educators to stimulate

innovative creative problem solving and new paths of thinking, yet these approaches are being deemphasized by curricula devised to produce higher achievement on standardized tests. According to a recent *Newsweek* article, America is experiencing a creativity crisis in American education. In the 1950s the research of E. Paul Torrance provided a way to measure creativity in children by tasks they completed. With creativity defined as the production of something original and useful, the tasks completed for testing had no one right or wrong answer, but instead used divergent and convergent thinking to arrive at a desirable outcome. The tests measured figural aptitude with pictures assessing such major mental characteristics as fluency, flexibility, elaboration, originality, resistance to premature closure and to abstract titles, as well as extensive emotional expressiveness, storytelling articulateness, movement or action, expressive titles, internal visualization, richness and colorfulness of imagery. Verbal components were not tested. Given a problem and asked “How can you make this better and more fun to play with,” one eight-year-old boy amazed the administrators by quickly conjuring up at least twenty-five options. Children responding like this were tracked over the next fifty years, revealing such accomplishments as books, publications, awards, patents, productions, compositions, and designs. A significant number of children who demonstrated more creative solutions to tasks on the Torrance tests grew up to be inventors, authors, doctors, and other high achievers.<sup>2</sup>

The Torrance tests have been surprisingly accurate as a standard for measuring creative performance and

potential creative output, but not IQ. Studies in the 1990s found a correlation between creative accomplishment and childhood IQ at a ratio of 3 to 1, suggesting that IQ is not necessarily an accurate predictor of achievement. Nevertheless, reliance on academic achievement measured through standardized tests, rather than any assessment of creativity, has largely determined access to higher education. Generous funds and effort are devoted to remedial performance in an attempt to raise grades and improve test scores, and student tests are becoming a significant measure of teacher performance. Meanwhile, a recent study suggests that as intelligence scores continue to rise, creativity scores have been on a steady decline since 1990.<sup>3</sup>

## What Factors Might Contribute to the Decline of Creativity?

We can speculate on a few factors that contribute to this decline. Children are watching more television; are playing more video games and have less time for play at home and in school, where some schools have minimized recess. Their lives outside of school have become more scheduled. Imaginative play, role playing, and exploring offer the chance for risk-free testing. Thought and discovery need to be encouraged to protect childhood creativity, using any variety of materials on hand like cardboard boxes, blanket tents, and blocks. It is important to foster free association and problem-solving, with risk and failure as key elements in arriving at new solutions. Many families, especially the well-educated, cultivate an atmosphere of comfort with some risk, as well as confident self-expression. Although children may be over scheduled, the quality of the parental involvement and

engagement is high, as Malcolm Gladwell has pointed out in his recent book *Outliers*.<sup>4</sup> Parents coach their children by providing diverse opportunities and discussing diverse outcomes, empowering them to sort out ideas, question authority, and seek information that will lead to their own success. Observation, exploration, and educated risk become the formula for new decisions and ideas.

### Can We Teach Creativity?

The fact that the avocational interests of many noted achievers include at least one creative art or craft, music, poetry, or multiple creative pursuits shows the vital importance of creativity as a central part of education in order to produce growth and innovation in the workplace. We need to mandate the nurturing of creativity in the curriculum. Currently, California and Massachusetts lawmakers want to mandate the teaching and testing of creativity skills using Torrance's tests. Recent studies of divergent-skills testing question whether the Torrance test is a completely accurate predictor of creativity, but still admit it indicates personalities less likely to conform to structured situations and more comfortable in artistic disciplines. Although these studies conclude that creativity cannot be taught, and that mere divergent thinking only leads to being wrong in such fields as science and economics, they insist that all curriculums can be taught more creatively. Mere involvement in the arts does not guarantee creativity in writing or science, but the arts provide access to the creative thinking process better than any other core curriculum, assuring a foundation of innovation for the future workplace. As the Michigan Department of Education's Credit Guidelines in the Arts observe, "It is *insufficient* simply to take band or orchestra or a class in drawing or jewelry making or graphic design. Any course that wishes to satisfy the arts requirement must incorporate into itself, in an explicit manner, the teaching of and experience with the *entire creative process*."<sup>5</sup> A Florida study by a non-profit that uses art to teach critical thinking and visual literacy found

that students who participated in their Artful Citizenship program had significantly higher growth in visual literacy, and also showed higher achievement in math and reading. Tangential results included increased development of communication and critical thinking skills using art in "visual Thinking Strategies" that extended into other curriculum areas.<sup>6</sup>

Although academic achievement test scores provide a measure of success for entrance to college, creativity is a valued quality in those entering the job market. A 2007 survey of one hundred fifty-five corporate leaders and eighty-nine school superintendents, called *Ready to Innovate*, identified creativity and innovation as the most important—yet most elusive—skills to prepare students for the workforce. Although the study showed that employers indicated that individuals having some arts coursework might be more creative over those with technical skills, superintendents reported that the arts were electives in most curriculums and required in less than 10 % of the schools. This study suggests that diminishing the emphasis on creative coursework in education seems to work against building an innovative workforce.<sup>7</sup>

### Learning Outcomes of Art and Creative Experimentation

If we want to encourage the addition of creative experimentation in education, we have to invest in time, relaxation, and the encouragement of failure in the initial phases in order to make breakthroughs. A recent five-year experiment found that notable scientists who were encouraged in exploration and failure and given renewable project funding published more papers that earned high regard. A similar group, encouraged with non-renewable awards with stringent deadlines, had less noteworthy or successful outcomes.<sup>8</sup> Michele and Robert Root-Bernstein researched backgrounds of scientists and their work habits, careers, and life or cultural activities from 1958 to 1978 with unimpressive results. However, when the project was refocused in 1988 with a new emphasis on arts and crafts avocations,

recreation, time management, and scientific problem-solving tools, they arrived at more interesting results and correlations. Their work showed that Nobel laureates were more likely to engage in at least one type of artistic activity and some enjoyed up to twelve activities, considering the arts, poetry, dance, music, cooking and other creative outlets as part of being an educated scientist. Those who participated in a creative endeavor tended to have more successful results in their scientific work. It was also found that they managed their time to allow for their hobbies, selecting shorter term projects that resulted in more success. They thought that their avocations contributed greatly to a broader "mental toolbox" to assist with problem solving, and they also valued relaxation as a way to refresh their minds. They produced more successful projects than their counterparts who believed that if they worked long and hard on one project, they would eventually see results.<sup>9</sup>

The Root-Bernsteins have noted that computer chips are a combination of etching, silk screen printing, and photolithography. NASA uses chiaroscuro techniques, a shading technique of the Renaissance to enhance images. In medicine, we can attribute surgical stitches to the lace making origins, and the list continues. Indeed, "Scientific creativity depends not only on a well-oiled imagination coupled to habits of hard work, but, more importantly, on the ability to integrate in functional ways, a wider range of ideas, concepts and skills than usual."<sup>10</sup> These authors also reviewed the arts as an economic stimulus. In a recent blog, the authors cite several inventions that have artistic roots. Cell phones or PDAs rely on an encryption method called frequency hopping, a musical application adapted for use during WWII by composer George Antheil and actress Hedy Lamarr for transmission of radio waves to launch torpedoes. Such evidence makes it clear that the arts do drive innovation and successful scientists, and that inventors are artistic people.<sup>11</sup> Discovery, relaxation and play were key components of creative thinking in

another project in Michigan. In 1983, a collaborative project of the Michigan School system and twelve Michigan arts organizations wrote as a premise to their findings that “playmaking, acting out ideas, drawing and sculpting, dancing and making music with instruments are natural and essential means for people to gather and process information. For some children, their primary voices for communication and expression lie in the visual, aural and kinesthetic realm.”<sup>12</sup>

### **Seeing Things Differently Defines Thinking Skills for Innovation**

We learn everything through our senses. Research has found that our eyes are not only the pathway to our souls, but they absorb more information than we consciously realize for our minds to process. Harvard psychology professor Rudolf Arnheim described how humans learn to see and understand through visual stimuli:

Art may seem in danger of being drowned by talk....We have neglected the gifts of comprehending things through our senses... Our eyes have been reduced to instruments with which to identify and to measure; hence we suffer a paucity of ideas that can be expressed in images and an incapacity to discover meaning in what we see.<sup>13</sup>

A subsequent research study has determined five levels of aesthetic visual understanding. The lead psychologist wondered if these levels could be taught, so she formed partnerships with schools to ask some very basic questions of the participants in the beginning aesthetic stages, directing them to find visual clues from what they saw and use them to construct a narrative for the work of art. Two basic questions—“What is going on in this picture?” and “What do you see that tells you that?”—initiate discussion that investigates a work of art visually without judgment and helps to develop a narrative. The follow up question, “What do you see that tells you that?” directs analytical thinking and evaluation.<sup>14</sup>

The early childhood activity of fashioning narratives from visual clues in

art enhances the ability to recognize and create patterns, a valuable skill in creative problem solving and obviously essential to driving an innovative culture. According to the Root-Bernsteins, a psychological study found that babies rely on building patterns from visual and auditory cues to form their first ability to recognize and remember familiar objects. The more patterns we recognize and remember, the broader our sense of curiosity throughout life. Leonardo Da Vinci found recognizing and mentally storing patterns one of the ways of arousing his mind to various inventions.<sup>15</sup> A landmark study of the physiology of creativity found that the self “combines patterns together to create new ones that do not exist anywhere in reality, or it takes a small pattern from its surroundings and extends it in an imaginative elaboration.” Patterns are picked out of the environment solely on the basis of familiarity and thus become ever more familiar. Today many corporate training initiatives are attempting to recapture the creative thinking skills lost in our current educational model. A major university’s business school recently included pattern recognition as part of its training for executives.<sup>16</sup>

### **Value Judgments in Perception: Learning through the Senses**

Perception—understanding through the senses—plays a key role in learning, as shown by a values-based teaching method aimed at high school students that explores how a work of art can initiate a broader perspective on a topic that is not directly associated with it. The pattern of e.e. cummings’ poem *Falling Leaves* creates a visual sense of falling through the separation of letters. The method guides the interpretation through a sequence of questions that lead thinking and visual analysis to a study of nature, a study in gravity, and a parallel in life circumstances. The humanities once included science and mathematics, but with measurable outcomes becoming prominent in these fields, relying on the more logical areas of thinking, the humanities are now considered the arts and philosophy. Nevertheless, this division

between measurable outcomes and perception includes value judgments for both. Science facts can lead to a value judgment based on a subjective inference, while judgments about art are based on the possibilities suggested by perception. Another art work used by this method to train perception is Cezanne’s painting *Mont Sainte Victoire, 1886-87*. The viewers rely on visual cues the artist has imbedded in the work to define the meaning the artist sought.<sup>17</sup> Creative thinking skills begin with a problem to solve through investigation. As Edward de Bono has pointed out, perception is one of the most important elements of creative thinking, yet traditional education prefers logical deductive and critical thinking.<sup>18</sup>

### **Tools for Teaching Creative Thinking**

Asking whether creative and critical thinking can be taught, a current blogger concludes that over time by modeling behavior, asking probing questions, offering field trips and providing other investigative opportunities, a school can support a student’s learning to think creatively and critically, though measuring the outcome is the challenge.<sup>19</sup> In another blog, Rob Stokes describes an Early Design Education program that teaches a dimensional approach to problem solving, using design thinking to connect creative and analytical thinking. Usually introduced at the college level, this collaboration between Texas high school students and a professional design firm had successful results. Students were given real-world problems to solve including materials, costs analysis, and budgets, making the learning relevant with tangible outcomes. The process also provided a forum to test and evaluate their ideas.<sup>20</sup>

Creative thinking requires a combination of a declared problem; time; relaxation; observation; idea generation; analysis; and conclusion. Dr. de Bono has systematized this approach in his Six Thinking Hats corporate training program. The six colored hats represent separate thinking styles, with the blue hat as the overall logical sequencer of the group that owns the agenda. The other colors—red

for feelings, green for creativity, yellow for feasibility, white for outside information, and black for risk analysis—represent various ways of thinking about a problem. Participants are encouraged to approach a problem by trying each thinking style, figuratively placing a new color hat on their heads. This Parallel Thinking method ensures all ways of thinking about an issue are considered; ultimately a team can be ushered toward the common results after careful analysis of new options.<sup>21</sup> The method breaks down complex thinking skills into a practical methodology, helping the corporate structure recover the innovative thinking lost in an educational system badly needing revitalization, where creative skills learned outside the classroom through engaging in free play and in creative activities are marginalized by a society competitively over-scheduling youngsters to meet defined standards of achievement. In an economy driven by creative solutions for innovative product development, arts education should become more than a fringe subject in our educational priorities.

According to an advocacy consortium that includes Apple, Microsoft, and Intel, “There is a profound gap between the knowledge and skills most students learn in school and the knowledge and skills they need in typical twenty-first-century communities and workplaces.” Along with the three Rs and other crucial academic subjects, this partnership’s members assert, students ought to be learning four Cs: critical thinking, communication, collaboration, and creativity; and America’s schools are not set up for this. Unless U.S. businesses help bring about systemic changes, experts argue, they’ll eventually find themselves outmatched by nimbler and more innovative overseas competitors.<sup>22</sup> Here we see a corporate sector investing in innovative thinking strategies to compensate for what has been lost in an outdated educational system. A Wisconsin consulting firm seeks “unorthodox results” through a methodology for corporate training in creative problem-solving and innovation based on the

premise that ideas alone do not drive new solutions of economic value.<sup>23</sup> According to Jacob Bronowski, inventors often take an interdisciplinary approach to problem solving that leads to combinations and explosions when one moves outside the “master” comfort zone.<sup>24</sup>

### Conclusion

To solve our modern world’s challenges, we need to stimulate new ideas through a system that supports and nurtures critical, creative, collaborative, and divergent thinking in early education efforts as well as the lifelong pursuit of innovation. Ideas come from tangential associations, random pairings, relaxation, and broad learning in order to see that which has not been seen before, making matches of theories, ideas and associations that are new, fresh, and yes, innovative. Nobel laureates are nurtured over a lifetime of pursuit, seeking knowledge, giving in to curiosity, and reconnecting with the value of play, which often leads to discovery. The freedom to discover and create new associations presents a path to innovation. Immediate eureka moments may not always result, but such practice shapes a lifestyle toward long term personal rewards and has repeatedly made unimaginable contributions to society as a whole.

### Notes

1. HM Government, The Business Link, <http://www.businesslink.gov.uk/bdotg/action/home?r.i=1073792537&r.11=107388796&r.12=1074298365&r.13=1074027604&r.s=b&r.t=RESOURCES>

2. Po Bronson and Ashley Merryman, “The Creativity Crisis,” *Newsweek.com*, July 10, 2010, <http://www.thedailybeast.com/newsweek/2010/07/10/the-creativity-crisis.html> [Accessed August 17, 2012].

3. Ibid.

4. Gladwell, Malcolm, *Outliers: The Story of Success*, Little and Brown, New York, c.2008, pp.102-110.

5. Michele and Robert Root-

Bernstein, “Do Arts Teach Creativity,” *Psychology Today Blog*, entry posted April 30, 2011, under “Imagine That!” <http://www.psychologytoday.com/blog/imagine/201104/do-arts-teach-creativity> [accessed August 16, 2012]. The Root-Bernsteins conclude: “Unlike creativity itself, the creative process CAN be taught. Attention can be paid to the challenges that have motivated creative individuals; the problems (technical and social) they have faced in meeting those challenges; the new skills and knowledge they have needed to acquire in order to address those problems; the options they have played with in exploring possible solutions; the realizations they have had that what they really wanted to do wasn’t what they had set off to do; the role serendipity and chance have had in the final production of their work; the role that performing or publicizing their work has had in pushing them to modify and rethink their goals; and the struggles they have had in achieving recognition. This is the process that will prepare students for doing creative things in the world, not a high score on a divergence-based test or a ho-hum exposure to debate team, science fair or art making.” See also Bonnie Cramond, “The Torrance Tests of Creative Thinking: From Creation through Establishment of Predictive Validity,” in Rena F. Subotnik & Karen D. Arnold (Eds.), *Beyond Terman: Contemporary Longitudinal Studies of Giftedness and Talent Education* (pp.229-254). Norwood, NJ: Ablex, 1994, 229-254.

6. Fely Curva et al., *Artful Citizenship Project, Three-year Project Executive Summary* (Miami, FL: The Wolfsonian-Florida International University, 2005), <http://vtshome.org/system/resources/0000/0003/Miami-FL-VTS-Study.pdf> [accessed August 17, 2012]. Providing a rich vein of research and collateral bibliography, this study defined visual literacy as the ability to interpret an image, creating meaning or gaining information from it. The link to this pdf was provided by VTS (Visual Thinking Strategies), a program founded twenty years ago by Abigail Housen and Philip Yenawine, used widely in museums, schools, and

colleges.

7. James Lichtenberg, Christopher Woock and Mary Wright, *Ready to Innovate: Are Educators and Executives Aligned on the Creative Readiness of the U.S. Workforce?* (New York: The Conference Board, 2007), 9, [http://www.artsusa.org/pdf/information\\_services/research/policy\\_roundtable/ReadytoInnovateFull.pdf](http://www.artsusa.org/pdf/information_services/research/policy_roundtable/ReadytoInnovateFull.pdf) [accessed August 16, 2012].

8. Peter Dizikes, "How to Encourage Big Ideas," *MITNews*, December 9, 2009, Massachusetts Institute of Technology, <http://web.mit.edu/newsoffice/2009/creative-research-1209.html> [accessed August 17, 2012].

9. Michele and Robert Root-Bernstein, "Arts and Crafts: Keys to Scientific Success," *Psychology Today Blog*, entry posted March 6, 2009, under "Imagine That!" <http://www.psychologytoday.com/blog/imagine/200903/arts-and-crafts-keys-scientific-creativity> [accessed August 16, 2012].

10. *Ibid.*

11. Michele and Robert Root-Bernstein, "A Missing Piece of the Economic Stimulus: Hobbling the Arts Means Hobbling Innovation," *Psychology Today Blog*, entry posted Feb. 11, 2009, under "Imagine That!" <http://www.psychologytoday.com/blog/imagine/200902/missing-piece-in-the-economic-stimulus-hobbling-arts-hobbles-innovation> [accessed August 16, 2012].

12. Barbara Carlisle, *Making of a Grass Blade: A Study of Twelve Arts Projects in Michigan Schools* (Battle Creek, MI: W.K. Kellogg Foundation, 1990), 13-14.

13. Rudolf Arnheim, *Art and Visual Perception: A Psychology of the Creative Eye*, rev. ed. (Berkeley: University of California Press, 1974).1.

14. Housen, Abigail, *Eye of the Beholder: Research, Theory and Practice, 2001*. New York: Visual Understanding in Education, 2001. 5-17.

15. Michele and Robert Root-Bernstein, "What's The Pattern?"

*Psychology Today Blog*, entry posted March 31, 2011, under "Imagine That!" <http://www.psychologytoday.com/blog/imagine/201103/what-s-the-pattern> [accessed August 16, 2012].

16. Edward De Bono, *The Mechanism of the Mind* (New York: Penguin Books, 1969), 124. Pattern recognition was featured in this 2012 graduate business course description: "Remove the filters that block creativity by recognizing how the human mind uses and recognizes patterns. Participants will also learn ways to enhance creativity by surrounding themselves with ethnic diversity, diverse intellectual outlets to spark imagination, learn mental agility and infuse passion into their everyday lives." University of Wisconsin-Madison School of Business, Executive Education, *Creating a Culture of Innovation, a three day course offered two times per year on the Madison campus*, <http://exed.wisc.edu/Courses/Creating-a-Culture-of-Innovation> [accessed August 31, 2012].

17. Martin, F. David, and Lee A. Jacobus, *The Humanities through the Arts* (New York: McGraw-Hill, 2008), 2-3, 12-13, 80-82, color plate 4.

18. Edward De Bono, *I Am Right, You Are Wrong* (New York: Viking Penguin, 1991), 247-48.

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