

Principles of Learning on which Civilized Systems of Education Depend

By Jeffrey L. Peyton

In 1841, near the sunlit mist of an Alpine waterfall, a rainbow caught Faraday's eye.* In his journal, he recorded his observations about the "steadfast" behavior of light amidst the "storm of passion sweeping across it." Typically, Michael Faraday would share his observations with his friend, James Maxwell. Nobel-prize winning physicist and author, Richard Feynman, declared that, "From a long view of the history of mankind—seen from, say, ten thousand years from now—there can be little doubt that the most significant event of the nineteenth century will be judged as Maxwell's discovery of the laws of electrodynamics." But arguably it was Faraday's discovery in the mist that marks the moment of conception.

Both Faraday and Maxwell are extraordinarily important in the history of modern physics, and yet, unlike Einstein, who read and greatly respected their work, neither is well known to the lay public.

The fact that the two scientists responsible for the technological world we've inherited are largely invisible suggests that, in matters scientific, we moderns, despite being informed and connected, remain clueless about the rich processes of mind that gave us the human world we have today—and of which more will be needed in order to save it.

The patterns of light that captivated Faraday certainly reflect inspiration, but more importantly constitute a quality of mind and a way of thinking that attracted these scientists to one another. It enabled them to see something not only in nature, but also in each other's ideas that only they were capable of understanding at the time. Some call this 'genius', but perhaps they were led quite naturally to their individual discoveries by asking questions that, in Einstein's words, "only children ask."

Given today's mass populations of children requiring education, and the regressive policies of state and federal government enacted to "educate" them, the question isn't what we can teach children, but what we can learn from them. How can we create a learning culture truly reflective of and responsive to the nature of children? In America,

* Note: The above account of Michael Faraday's discovery is adapted from *In The Mind's Eye: Visual thinkers, Gifted People with Learning Difficulties, Computer Images, and the Ironies of Creativity* by Thomas G. West.

how can we fashion an education that exemplifies the unique qualities of our national character—our diversity, good will, innovation, and unbridled optimism?

From a theoretical desire to understand the universe, science has reached a point of no return—it must ignite, through brain research, a new understanding of human learning. The capacity for reinvention is the benchmark of human evolution. With the global challenges we face, how we cultivate learning becomes the signature of our future and our fate. If our survival as a human community depends on our intuition and imagination, then triage dictates that it is the failing health of the stepchild we call Education that demands our full, unflinching care and attention. The institution of science itself is at risk when large numbers of the young, conditioned in schools that stifle individual voice and vision, bow to the dictates of the short answer and the end product. When the accomplishments of science repeatedly reflect boldness as well as receptivity in thinking and vision, why do we still cling to *academics* as the Rosetta stone to decode the majesty of children's minds? How can we continue to allow schools to fail nearly *two-thirds of the children they serve*, according to the latest national report card, while granting them the power to label the children they do not reach as "failures?" Why have we allowed the least imaginative among us to erect a "Play Principle"

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system of learning that Houdini—let alone the coming generations—could not 'think himself out of'?

In a microchip world more invested in inventing the smallest communication gadget than in solving the greatest of human problems, we Jetsons anticipate the deeper migration of technology into the culture, creating 'smart' homes and 'smart' products. With the escalating rate of teen suicide fueled by the roiling pressures and poisons of a standardized, dysfunctional learning culture, education leaders should be asking an important question about the 'nature' of communication—*where in our future is the 'smart' classroom?*

At its core, the classroom is a product universally defined by the physical and chemical properties of its communication. If the classroom is ever to become 'smart,' I propose that the energy of play provides the key. Play, which bonds adult and child, socializes, civilizes, and enlivens, is uniquely capable of reconfiguring the 'flat' nature of classroom communication, and of turning its rigid, artificial character into a living habitat. To implement reform in education, a symbolic play language can be employed to introduce 'smart matter' into communication. With the main artery of communication targeted, the cells most resistant in the learning culture—content, communication, and behavior—can be reached systemically, and changed. Harnessing play energy,

the best attribute that nature has given to human communication, is the most efficient, economical, and immediate route to an enlightened future for education—and to the larger world of human discourse it ultimately shapes.

I have arrived at these conclusions not by academic exercise, but by gazing into a strange reality not unlike the mist Faraday gazed into. My path has followed in the tradition of field biologists who have researched the communicative behavior of apes, ants, and bees, except in my case the focus on communication was sparked by art-based life forms that are unique to human communication, namely *puppets—and by the response of children to them.*

This fact is perfectly acceptable to children, but usually not to the average adult. In general, adults perceive puppets casually as playthings, and even when they become highly visible, puppets are treated as entertainment, not as viable communication media. The love children of all ages show for puppets is intrinsic, universal, and unconditional—and why not? —the diminutive, hand-actuated lifelike form embodies and speaks to the symbolic nature of the child's mind. More organic than any other art form, the hand puppet qualifies as art that, in the words of Harvard scientist E.O. Wilson, serves as 'an agent of nature.' Communicative puppet art incorporates projected play—meaning play, unlike sport, "Play Principle"

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that elicits spontaneity, surprise, and insight. Playfulness in this sense is perhaps the most important refinement of brain evolution—the soil in which great inventors and scientists establish their work. Play in this sense fosters relatedness and connectivity, especially in the young.

Pointing to the presence of a hand puppet, *only children* ask "is that real?" proving that Einstein, even in subjective matters of human learning and communication, understood something profoundly childlike that brain scientists are only just beginning to appreciate: that art is a living conductor of evolution in human culture. E.O. Wilson, bravely, has called for the merger of the arts and humanities into the natural sciences. Are puppets real—in terms of their effect on the brain? With the interest and support of medical school laboratories in Norfolk and Philadelphia, brain-imaging projects are under way to determine whether the spontaneous, symbolic communication of puppet play distinguishes itself as a brain integration cue. Even if the current technology is not advanced enough to answer the question conclusively, children will always have the final word on this one.

Thinking symbolically for himself at age 16, Einstein imagined what it would be like to ride on a beam of light. His do-it-yourself field trip led him to frame

field theory and relativity. Seeing children and teachers routinely take trips like this through use of communicative puppet play, I began to see a practical 'symbolic language' potentially housed inside the puppet medium. Employing a paper hinge that you fold and hold in the hand, puppet language is similar to the 'computational origami' used at MIT. Whereas the origami is used to explore such enfolded worlds as DNA structure and air bag configuration, puppet language provides physical expression of the inner world of mind and symbol. Puppet language allows anything "on your mind" to take on life in your hand. For years my work has involved showing teachers how to speak this language. As they begin to use it, teachers record in journals the changes which they, their students, and their classrooms experience as the language quickly establishes itself. With tools rooted in play, the walls and resistances that teachers battle daily with students consistently and predictably neutralize before their eyes.

There is something alive and mesmerizing in the movement of puppet play. It is a phenomenon of communication whose charmed and magnetic properties are capable of passing through the dense walls of the education 'box'. Hand children the language of invention, and they will speak it. Hand it to teachers, and, seeing the young they teach as if for the very first time, they reach them equipped with extraordinary insight

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and knowledge. Peer with me into the mist—into the eyes of teachers and children freed and emboldened by the lightness of play—and behold a force could that can readily transform the learning culture in the same way electromagnetic force transformed modern life.

The hand puppet is a descendant of symbolic, intuitive thinking—the stuff of myth and dreams. Although it predates spoken language, symbolic thought is the basis of the oral storytelling tradition universal to human culture. By contrast, conventional 'book thinking' and mass interest in reading only recently peaked in the modern world on waves begun by Gutenberg's printing press 500 years ago. To academic literalists, symbolic thinking is less intelligent than book thinking, but ironically powerful media monopolies exploit symbolic thinking in their movies, animation, and advertising with pervasive influence on global culture. TV in its McLuhanesque way bathes our culture in visual and symbolic light. Computers liberate text and images, and allow communication to be moved and manipulated.

In contrast, the impact of a handheld paper media on the classroom is all about *changing the nature of communication*. In classrooms ranging from early childhood college foreign language, puppet play escapes its juvenile limitations. Physically grasped in hand, ideas become concrete and personal. In the gesturing, tool-

making hand, speech and language evolved. By granting play, the hand, and the symbol their rightful roles in the human drama, classroom experience flows, children articulate, and fear of learning dissipates, and communication moves playfully in step with the universe.

Hand-held representations of clouds, planets, seeds, raindrops, gears, ears, germs and flowers are but a few isolated symbolic life forms part of an infinite symbolic and communicative species. They may be described as morphic fields of information capable of fostering evolutionary changes in educational behavior, and appear to possess the physical forms of automata that rely on the mechanisms used by the real brain. Like the flowering plants that once spread across a monotone green earth, these forms, appropriately engineered, give rise to a multidimensional, integrated, ever-unfolding landscape for learning and discovery—the way the brain intended.

"In view of the prominence of play among mammals and its civilizing influence in human evolution," wrote Paul D. MacLean, Senior Research Scientist Emeritus, Department of Neurophysiology, National Institutes of Mental Health, "it is curious that it has received so little attention in neurobehavioral research. In one handbook of experimental psychology, for example, the subject of play is dealt with in less than a page, and in a three-volume "Play Principle"
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handbook of Neurophysiology, there is no reference to play."

Over the past 20 years, brain science has flowered. We know now what the brain requires for productive and meaningful learning. We know that emotions warm and fire neuronal activity to create 'smart' communication inside the brain. The promise of a system of education based on the knowledge of the brain is not more academic facts and the gigabyte capacity to retain them. It is, rather, the heightened understanding of our instinctive resources for learning upon which our learning systems can be reformed. As Faraday and Maxwell and Einstein have shown us, it is not the subject matter that "teaches" us the right knowledge; rather, it is discovery revealed through our grasp of experiences and the human relationships we share. By erecting an education grounded upon the best attributes of human nature, new pathways of awareness and sensibilities will open to a human future vastly more healthy and productive in mind.