

## Myths About Learning

©2001-2002 Judith Lloyd Yero

*“Research shows that you begin learning in the womb and go right on learning until the moment you pass on. Your brain has a capacity for learning that is virtually limitless, which makes every human a potential genius.” ~ Michael J. Gelb*

There are dozens of learning theories, each viewing learning from a particular point of view—a single perspective. As such, each contains useful insights. It’s interesting, however, that most of these theories fail to address the *process* of learning. How, specifically, does learning occur?

*“[In] typical learning research...the continuing process of learning is never directly assessed. Usually, some hypothetical construct located inside the head, such as a schema or a trace is said to be built up or strengthened as a result of the learning process. ...Learning, in this somewhat impotent view, is a covert process forever inaccessible to observation: only the effects of practice may be seen....”<sup>(1)</sup>*

Some early theories attributed an individual’s ability to learn to his or her genetic inheritance. Others perceived the brain/mind as a blank slate—John Locke’s *tabula rasa*—upon which everything required to become a functioning human had to be “written.” Today, despite ample evidence that infants in the womb are already learning and that intelligence is far from fixed, some persist in believing that some students are “born smart” and others are “born dumb.” Rather than a lengthy comparison of learning theories, let’s just look at two aspects of learning as it is found in many of today’s schools.

### Education’s Blind Spot

Learning theories that ignore the substrate in which learning occurs—the brain/mind—run a risk similar to an architect who designs a building that is impossible to construct with available building materials and techniques. Theorizing about learning without considering the ‘wetware’ that supports it can result in elegant, but completely meaningless theories.

“Brain-based learning” has become a familiar battle cry for bringing education in line with current knowledge of the brain. Like “back to basics,” it is a phrase used with little thought as to its actual meaning. *All* learning of the type addressed in schools is “brain-based” so the term is relatively meaningless.

However, making sure that schooling is *brain-compatible* is certainly a valid concern. What possible excuse can educators make for continuing to teach in ways that are not compatible with the brain’s natural processes? With the information available from the “brain revolution” of the past several decades, continuing to teach in ways that inhibit learning by discouraging, ignoring, or punishing the brain’s natural learning processes is reprehensible.

*“We don’t have to make human beings smart. They are born smart. All we have to do is stop doing the things that made them stupid.”~ John Holt*

Despite the lip service paid to individual differences, traditional education has failed to move away from the group mentality that has driven it for so many years. The very language of education, which separates students into *grades, classes, honors, average, remedial, LD, BD, even learning ‘styles,’* forces the mind into perceiving groups, not individuals.

*“[In education]...the individual is just a statistic. Everybody is treated the same. Any differences due to experience, maturation, ancestry, or what the subject had for breakfast are canceled out. The organism, to put it bluntly, is treated like a machine whose task is to associate inputs and outputs. Any autonomously active, intrinsic organization within the organism or between organisms and their environment, although present, is swept under the rug.”~J. A. Scott Kelso<sup>(2)</sup>*

There is an interesting “blind spot” in traditional education that permits time-honored group-think to continue. Consider the following four statements:

1. People look different. In fact, humans are surprised when they see two individuals who look alike. The difference in people's appearance is an accepted fact of life. Someone who suggested that everyone should be required to look the same would be viewed with suspicion. Would any rational person suggest that all fourteen-year-old humans should be five-feet six-inches tall, blond-haired, blue-eyed, and able to bench press one hundred pounds?
2. According to the Human Genome Project, there are about *three billion* base pairs making up the genes and DNA in a human being. Only a portion of those genes are responsible for a person's appearance and physical abilities. These genes can be damaged but remain relatively unchanged in their operation over the life of the individual. Although it's possible to change one's physical appearance through exercise, surgery, or cosmetic methods, physical appearance remains relatively constant throughout life.
3. The human brain is composed of about *ten billion* neurons, each of which has perhaps ten thousand connections to other neurons. This results in approximately *one hundred trillion* connections in the brain. Unlike genes, each of these connections, from the moment of formation, is subject to change by interactions with the environment—through experience. In other words, the brain is constantly *changing* in response to experience.
4. No two people—even identical twins—have the same experiences as they grow and develop.

Taken together, what do these four statements suggest? *The number of genes and genetic variations that produce differences in physical appearance and ability are minuscule compared to the possible permutations in the way individual brains process information.* Given that no two individuals have lived through the same experiences—experiences that modify both the neurons and their connections—the *potential cognitive differences among human individuals is staggering.* Yet few people balk when reformers insist that all students should be responsible for learning the same things at the same age. **The statement flies in the face of reason, science, and experience. It is infinitely more irrational than insisting all fourteen-year-olds be five-feet six-inches tall.**

Although many traditional educators would accept the four statements as true, they are somehow able to put that information in a corner and forget it when it comes to teaching. Perhaps they are hoping that, like so many reform efforts, it will eventually go away if they ignore it. This is simply not going to happen. *The brains of students are not going to miraculously become alike for the convenience of education and the efficiency of assembly line transmission of knowledge.*

Attempts to introduce brain-compatible teaching in schools often result in teachers adding a few activities for different learning “modalities,” or giving students a “choice” of supplemental projects. These are apparently sufficient to salve the conscience and quiet that little voice that reminds us what really needs to happen. *These changes make little or no difference in the fundamental metaphor that drives education—filling mental containers with knowledge objects.* As long as this remains the primary purpose of education, focusing on individual differences is literally “unthinkable” unless there is a teacher for every student. Schools will continue to operate in ways that are, at best, only marginally compatible with the brain's natural processes.

### What the Brain Does Naturally

*“The problem is fundamental. Put twenty or more children of roughly the same age in a little room, confine them to desks, make them wait in lines, make them behave. It is as if a secret commission, now lost in history, had made a study of children and, having figured out what the greatest number were least disposed to do, declared that all of them should do it.”*

~ Tracy Kidder

Isn't it amazing how well suited humans are to the world in which they live? No, not really! If humans had evolved on a different planet—in a different environment—they would have taken a much different form. The environment determines the behaviors necessary for survival and those behaviors influence the structure of the organism.

Although some people don't like to be reminded of it, humans are animals. Evolutionary psychologists Leda Cosmides and John Tooby<sup>(3)</sup> explain that the brain consists of a vast and complex collection of circuits. Each of those circuits evolved in response to some problem within the environment. It adapted to its environment. Originally, those adaptations had little to do with intellectual issues and everything to do with survival of both the individual and the species. Over time, as the environment demanded more complex functions, these same circuits have combined and been further “tuned” to do cognitive work.

What we do know is these circuits *did not* evolve to be repositories for isolated facts or “bodies of knowledge” that have been externally assembled and deemed “basic concepts.” They evolved in response to actual situations that arose in the environment of the organism. The organism learned to detect certain patterns and to link those patterns to certain behaviors.

It wasn't necessary for early man (and woman) to be able to *name* a saber-toothed tiger and *identify* its genus and species. It was necessary for them to *recognize a pattern* against the background of the jungle, associate that pattern with large teeth and claws, and engage in the appropriate behavior to ensure their survival! The “natural” functions of the brain rest on this ability to detect patterns in a complex environment and to associate the patterns with appropriate behaviors.

After many years of trying to make computers *learn* like humans, researchers in artificial intelligence (AI) realized that learning is *not* the result of amassing huge quantities of information and related rules of processing. The successes that AI researchers have had in reproducing even the simplest tasks of which the human brain is capable have come when the “computer” was allowed to interact with the environment and *create its own rules*—“tune” its own circuits—in short, learn.<sup>(4)</sup>

Yes, schools have managed to stuff human brains full of information (input) and get corresponding output on tests. They've done this with sufficient success that reformers now demand even more information and more tests. What will happen a hundred years from now? With information proliferating at a geometric rate, will students be required to attend forty years of schooling to amass the required “essential knowledge”?

The fact that many students have successfully adapted to this form of schooling is hardly a defense of the present system. It is, instead, an endorsement of the tremendous ability of the brain to adapt to unnatural conditions. A human can survive and function on a marginal diet of foods, but that cannot be used as evidence the diet is appropriate.

What more might be achieved if students were permitted to interact with various environments in a “real world” context; to “turn on” and “tune” their innate abilities; and to learn in ways that the brain does naturally? The human brain has adapted to:

- ▼ Interact with a complex environment.
- ▼ Abstract patterns from the complexity in that environment.
- ▼ Modify itself so that it functions more effectively in that environment.
- ▼ Solve “real” problems it perceives in that environment.
- ▼ Attend to that which it finds personally relevant or interesting.<sup>(5)</sup> The adaptive value of that tendency is obvious. Noticing aspects of the environment that were a potential threat to self—or that might become a potential mate—ensured not only a creature’s personal survival but also that of the species.

As we examine today’s schools, we find:

- ▼ Brains that require complexity being bombarded with simplified basics.
- ▼ Brains that require interaction with the environment to activate their innate processes receiving their “experience” second hand through the words (and perceptions) of a teacher.
- ▼ Brains that have adapted to solve complex problems relevant to self being denied the opportunity to identify those problems and forced to solve predefined problems with predefined answers.

Reforms appear to address how educators can make the brains of students conform to what education is rather than asking the question that would truly transform schools. *How can schools be made more compatible with the way humans learn?*

The answers we get are a function of the questions we ask. It’s time to change the fundamental question of reform. In the words of Albert Einstein, “The significant problems we face cannot be solved at the same level of thinking we were at when we created them.”

For a continuation of this discussion, see Chapter 11 in *Teaching in Mind: How Teacher Thinking Shapes Education*.

## References

1 Kelso, J.A. S. (1995). *Dynamic Patterns: The Self-Organization of Brain and Behavior*. Cambridge and London: A Bradford Book, MIT Press, 161.

2 Ibid.

3 Cosmides, L. & J. Tooby. (1992) From Function to Structure: The Role of Evolutionary Biology and Computational Theories. In M. Gazzaniga (Ed.). *Cognitive Neuroscience*. New York: Oxford University Press. p. 1199

4 Rao, V. & R. Hayagriva. (1995). *C++ Neural networks and Fuzzy Logic*, 2<sup>nd</sup> ed. New York: MIS Press, 1-20.

5 Edelman, G. (1992). *Bright Air, Brilliant Fire*. New York: Basic Books, 143 and Damasio, A. (1994) *Descartes' Error*. New York: Avon Books, 165.

[Note: Portions of this article were excerpted from *Teaching in Mind: How Teacher Thinking Shapes Education* by Judith Lloyd Yero. Published in January, 2002 by MindFlight Publishing, P.O. Box 1738, Hamilton, MT 59840 (ISBN 0-9711983-3-0). For permission to reprint or use any part of this article, please contact [info@mind-flight.com](mailto:info@mind-flight.com).]