Brain-Based Teaching

Mankind's universal love of stories presents educators with a powerful tool.

By Edward O. Wilson

The scientific method is not natural to the human mind. The phenomena it explicates are by and large unfamiliar to ordinary experience. New scientific facts and workable theories, the silver and gold of the scientific enterprise, come slow and hard, less like nuggets lying on a streambed than ore dug from mines.

The reason is the innate constraints of the human brain. Gossip and music flow easily through the human mind because the brain is genetically predisposed to receive them. Theirs is a Paleolithic cogency. Calculus and chemistry, in contrast, come hard, like ballet *en pointe*.

Of the hundreds of fellow scientists I have known for more than 50 years, from graduate students to Nobelists, all generally prefer at random moments of their lives to listen to gossip and music rather than to scientific lectures. Trust me. Physics is hard, even for physicists.

We all live by narrative, every day and every minute of our lives. Narrative is the human way of working through a chaotic and unforgiving world.

The narrative genius of *Homo sapiens* is an accommodation to the inherent inability of the three pounds of our sensory system and brain to process more than a minute fraction of the information the environment pours into them. In order to keep the organism alive, that fraction must be intensely and accurately selective. Facts presented in stories, as opposed to lists, are much easier to remember. Stories are our survival manuals.

Over the past three decades, cognitive psychology has emerged as a promising arena for understanding how we perceive, remember, and feel about the world around us. Researchers have learned that stories — both the ones stored in our memories and those we generate as we interact with the world — are essential to each of these aspects of learning.

Working on the same questions from different perspectives, neuroscientists, cognitive psychologists, and even evolutionary biologists are converging on a common theory of the brain: It develops stories to filter and make sense of the flood of information that we are exposed to every day. Across generations, they are converted into history, literature, and the oral tradition.

So, how can we make science human and enjoyable without betraying its nature? The answer lies in human's innate capacity to understand narrative. Along with Burkhard Bilger, I edited *The Best American Science and Nature Writing, 2001.* The authors succeed in conveying complicated, essential science to a broad audience in two ways.

SCIENCE: The central shaft of the cavern descends from the vegetated rim to the oblique slope of fallen rock at the bottom, reaching a maximum depth of 86 metres before giving way to a lateral channel. On the floor of this latter passageway, we found a small assemblage of troglobitic invertebrates, including two previously-undescribed eyeless species of the carabid subfamily embidini (see also Harrison, in press).

LITERATURE: *After an hour's rappel through the Hadean darkness, we at last reached the floor of the shaft almost 300 feet below the fern-lined rim. From there, we worked our way downward across a scree-like rubble at the very bottom. Our headlamps picked out the lateral cavern exactly where Romer's 1926 map claimed it to be. Rick pushed ahead and within minutes shouted back that he had found blind, white cave inhabitants. When we caught up, he pointed to scurrying insects he said were springtails and, to round out the day, at least two species of ground beetles new to science.*

First, they present the phenomena as a narrative, whether historical, evolutionary, or phenomenological, and second, they treat the scientists as protagonists in a story that contains, at least in muted form, the mythic elements of challenge and triumph.

Because science, told as a story, can intrigue and inform the non-scientific minds among us, it has the potential to bridge the two cultures into which civilization is split — the sciences and the humanities. Stories are an exciting way to draw young minds into the scientific culture.

One way of teaching science, which I adopted during 40 years of teaching at Harvard, is to begin with the big topics that mean something immediate and important to students — for example, What is life? What's the meaning of life?

Once you've got the attention of the audience, then you break the big questions down into stories, little dramas, that expose the trial and error process of science and the ideas that animate and move it forward.

Most educated people who are not professionals in the field do not understand science and technology, despite the profound effect of these juggernauts of modernity on every aspect of their lives. Symmetrically, most scientists are semi-literate journeymen with respect to the humanities. They are thus removed from the heart and spirit of our species.

This split is a huge problem. It is, if you will permit a scientist a strong narrative-laden metaphor, the central challenge of education in the 21st century.

(Dr. Wilson has written 20 books and won two Pulitzer prizes. Considered to be one of the world's greatest living scientists, he is often called 'the father of biodiversity.' This article was adapted from "The Power of Story," in* Common Knowledge, Vol. 15, No. 3, *the newsletter of The Core Knowledge Foundation.)