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OP-ED CONTRIBUTOR

**Put a Little Science in Your Life**By **BRIAN GREENE**

A COUPLE of years ago I received a letter from an American soldier in Iraq. The letter began by saying that, as we've all become painfully aware, serving on the front lines is physically exhausting and emotionally debilitating. But the reason for his writing was to tell me that in that hostile and lonely environment, a book I'd written had become a kind of lifeline. As the book is about science — one that traces physicists' search for nature's deepest laws — the soldier's letter might strike you as, well, odd.

But it's not. Rather, it speaks to the powerful role science can play in giving life context and meaning. At the same time, the soldier's letter emphasized something I've increasingly come to believe: our educational system fails to teach science in a way that allows students to integrate it into their lives.

Allow me a moment to explain.

When we consider the ubiquity of cellphones, iPods, personal computers and the Internet, it's easy to see how science (and the technology to which it leads) is woven into the fabric of our day-to-day activities. When we benefit from CT scanners, M.R.I. devices, pacemakers and arterial stents, we can immediately appreciate how science affects the quality of our lives. When we assess the state of the world, and identify looming challenges like climate change, global pandemics, security threats and diminishing resources, we don't hesitate in turning to science to gauge the problems and find solutions.

And when we look at the wealth of opportunities hovering on the horizon — stem cells, genomic sequencing, personalized medicine, longevity research, nanoscience, brain-machine interface, quantum computers, space technology — we realize how crucial it is to cultivate a general public that can engage with scientific issues; there's simply no other way that as a society we will be prepared to make informed decisions on a range of issues that will shape the future.

These are the standard — and enormously important — reasons many would give in explaining why science matters.

But here's the thing. The reason science really matters runs deeper still. Science is a way of life. Science is a perspective. Science is the process that takes us from confusion to understanding in a manner that's precise, predictive and reliable — a transformation, for those lucky enough to experience it, that is empowering and emotional. To be able to think through and grasp explanations — for everything from why the sky is blue to how life formed on earth — not because they are declared dogma but rather because they reveal patterns confirmed by experiment and observation, is one of the most precious of human experiences.

As a practicing scientist, I know this from my own work and study. But I also know that you don't have to be a

scientist for science to be transformative. I've seen children's eyes light up as I've told them about black holes and the Big Bang. I've spoken with high school dropouts who've stumbled on popular science books about the human genome project, and then returned to school with newfound purpose. And in that letter from Iraq, the soldier told me how learning about relativity and quantum physics in the dusty and dangerous environs of greater Baghdad kept him going because it revealed a deeper reality of which we're all a part.

It's striking that science is still widely viewed as merely a subject one studies in the classroom or an isolated body of largely esoteric knowledge that sometimes shows up in the "real" world in the form of technological or medical advances. In reality, science is a language of hope and inspiration, providing discoveries that fire the imagination and instill a sense of connection to our lives and our world.

If science isn't your strong suit — and for many it's not — this side of science is something you may have rarely if ever experienced. I've spoken with so many people over the years whose encounters with science in school left them thinking of it as cold, distant and intimidating. They happily use the innovations that science makes possible, but feel that the science itself is just not relevant to their lives. What a shame.

Like a life without music, art or literature, a life without science is bereft of something that gives experience a rich and otherwise inaccessible dimension.

It's one thing to go outside on a crisp, clear night and marvel at a sky full of stars. It's another to marvel not only at the spectacle but to recognize that those stars are the result of exceedingly ordered conditions 13.7 billion years ago at the moment of the Big Bang. It's another still to understand how those stars act as nuclear furnaces that supply the universe with carbon, oxygen and nitrogen, the raw material of life as we know it.

And it's yet another level of experience to realize that those stars account for less than 4 percent of what's out there — the rest being of an unknown composition, so-called dark matter and energy, which researchers are now vigorously trying to divine.

As every parent knows, children begin life as uninhibited, unabashed explorers of the unknown. From the time we can walk and talk, we want to know what things are and how they work — we begin life as little scientists. But most of us quickly lose our intrinsic scientific passion. And it's a profound loss.

A great many studies have focused on this problem, identifying important opportunities for improving science education. Recommendations have ranged from increasing the level of training for science teachers to curriculum reforms.

But most of these studies (and their suggestions) avoid an overarching systemic issue: in teaching our students, we continually fail to activate rich opportunities for revealing the breathtaking vistas opened up by science, and instead focus on the need to gain competency with science's underlying technical details.

In fact, many students I've spoken to have little sense of the big questions those technical details collectively try to answer: Where did the universe come from? How did life originate? How does the brain give rise to consciousness? Like a music curriculum that requires its students to practice scales while rarely if ever inspiring them by playing the great masterpieces, this way of teaching science squanders the chance to make students sit up in their chairs and say, "Wow, that's science?"

In physics, just to give a sense of the raw material that's available to be leveraged, the most revolutionary of advances have happened in the last 100 years — special relativity, general relativity, quantum mechanics — a symphony of discoveries that changed our conception of reality. More recently, the last 10 years have witnessed an upheaval in our understanding of the universe's composition, yielding a wholly new prediction for what the cosmos will be like in the far future.

These are paradigm-shaking developments. But rare is the high school class, and rarer still is the middle school class, in which these breakthroughs are introduced. It's much the same story in classes for biology, chemistry and mathematics.

At the root of this pedagogical approach is a firm belief in the vertical nature of science: you must master A before moving on to B. When A happened a few hundred years ago, it's a long climb to the modern era. Certainly, when it comes to teaching the technicalities — solving this equation, balancing that reaction, grasping the discrete parts of the cell — the verticality of science is unassailable.

But science is so much more than its technical details. And with careful attention to presentation, cutting-edge insights and discoveries can be clearly and faithfully communicated to students independent of those details; in fact, those insights and discoveries are precisely the ones that can drive a young student to want to learn the details. We rob science education of life when we focus solely on results and seek to train students to solve problems and recite facts without a commensurate emphasis on transporting them out beyond the stars.

Science is the greatest of all adventure stories, one that's been unfolding for thousands of years as we have sought to understand ourselves and our surroundings. Science needs to be taught to the young and communicated to the mature in a manner that captures this drama. We must embark on a cultural shift that places science in its rightful place alongside music, art and literature as an indispensable part of what makes life worth living.

It's the birthright of every child, it's a necessity for every adult, to look out on the world, as the soldier in Iraq did, and see that the wonder of the cosmos transcends everything that divides us.

*Brian Greene, a professor of physics at Columbia, is the author of "The Elegant Universe" and "The Fabric of the Cosmos."*

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Put A Little Science In Your Life Written By Brian Green. If we consider the ubiquity of personal computers, iPads and the net, it is not hard to see how science and technology have been woven into the very fabric of our day to day lives. When we see the benefits of things like MRI devices, CT scanners, arterial stents and pacemakers, we are able to appreciate immediately how science can affect our quality of life. If we assess the world's state and look at upcoming challenge such as climate change, pandemics, threats to security and a lack of resources, we won't hesitate to turn to science as But it's not. Rather, it speaks to the powerful role science can play in giving life context and meaning. At the same time, the soldier's letter emphasized something we've increasingly come to believe: our educational system fails to teach science in a way that allows students to integrate it into their lives. Allow me a moment to explain! More here. Science Fiction. Self Help. Sports. This book brings you a way to tap into Light's life changing resource. You will learn to work with Light and to use it as a tool for all aspects of your life. It will help you in personal growth and with your inner spiritual connection to God. This is a guidebook from the Light and for the Light. It will inspire and renew you. No matter wher "The power of light is infinite. This book brings you a way to tap into Light's life changing resource. You will learn to work with Light and to use it as a tool for all aspects of your life. To ask other readers questions about Put a Little Light in Your Life, please sign up. Be the first to ask a question about Put a Little Light in Your Life. Lists with This Book. This book is not yet featured on Listopia. This little ampule changed my life. After one use, my hair was soft as silk, shiny, and manageable. It was completely unreal how this product transformed my hair and I knew I had to find more. Promising review: "Science? Witchcraft? Who cares! Whenever I put them on, my nausea went away in minutes. When I took them off, I felt sick almost instantly. They do leave an imprint on your wrists, but that is nothing compared to the relief they provide. Also, science can be thought of not a subject but as a language of hope and inspiration, providing discoveries that fire the imagination and instill a sense of connection to our lives and our world. It is humans' nature of being curiosity. Then we may lose it as we grow up. The lessons. You've reached the end of your free preview. Want to read the whole page? TERM Spring '11. PROFESSOR Walsh. TAGS Science, Greene. Share this link with a friend: Copied! Literature Study Guides. Learn more about characters, symbols, and themes in all your favorite books with Course Hero's FREE s