



Pushing the Limits: Transformation Suggested Readings and Additional Questions

Science in Everyday Life: Heather Doyle

- What do you think of Heather?
- Is Heather an artist or an engineer?
- Does Heather’s “do-it-yourself” mentality resonate with you? Is it a familiar personality type in your community?
- If you are a do-it-yourself kind of person, can you see yourself as an engineer?
- Do you have a craft kind of hobby and if so, can you see now see it as engineering? Have you had to learn something about the materials or things that you work with in your hobby in order to get good at it?
- Do you learn by doing, listening, or reading – or some combination of those? What about people that you know? Are there different kinds of “learning styles”?
- Do you have experience of working together on a project that helped bring folks together? Can “engineering together” be a way to create community?

Suggested Books with Discussion Questions

(all book descriptions are from Amazon.com unless noted otherwise)

The Boy Who Harnessed the Wind: Creating Currents of Electricity and Hope

by William Kamkwamba

When a terrible drought struck William Kamkwamba's tiny village in Malawi, his family lost all of the season's crops, leaving them with nothing to eat and nothing to sell. William began to explore science books in his village library, looking for a solution. There, he came up with the idea that would change his family's life forever: he could build a windmill. Made out of scrap metal and old bicycle parts, William's windmill brought electricity to his home and helped his family pump the water they needed to farm the land.

Discussion Questions

- Could you imagine living without electricity? What would your life be like?
- How did the villagers compensate for not having electricity, telephones, or most of the modern conveniences we take for granted?





- What is the role of magic in the story? What about education? How would you contrast the two? Is there room for both in a culture?
- What motivates people like William to attempt the unthinkable? How would you describe him to someone who's never heard of his achievement?
- William writes of the corruption, greed, nonexistent services, and lack of empathy that turned the drought into a disaster for average people like him and his family. Can you see any similarities with our own culture, both past and present? Think about the American Depression. How did that compare to Malawi's drought?

Flight Behavior

by Barbara Kingsolver

Flight Behavior is a brilliant and suspenseful novel set in present day Appalachia; a breathtaking parable of catastrophe and denial that explores how the complexities we inevitably encounter in life lead us to believe in our particular chosen truths. Kingsolver's riveting story concerns a young wife and mother on a failing farm in rural Tennessee who experiences something she cannot explain, and how her discovery energizes various competing factions—religious leaders, climate scientists, environmentalists, politicians—trapping her in the center of the conflict and ultimately opening up her world. *Flight Behavior* is arguably Kingsolver's most thrilling and accessible novel to date, and like so many other of her acclaimed works, represents contemporary American fiction at its finest.

Discussion Questions

- What is the significance of the novel's title? Talk about the imagery of flight. How does it reflect transformation?
- How do the chapter titles relate both to scientific concepts as well as the events that unfold within each chapter itself?
- Describe Dellarobia. How is she of this mountain town in Tennessee and how is she different from it? How are she and her family connected to the land and to nature itself? How are they disconnected?
- Describe the small town in Tennessee where Dellarobia lives. What are the people like? How is life transformed in the small town as the story develops? How does Della react when she first sees the Monarchs? What greater meaning do the butterflies hold for her?
- How is she like the butterflies? How does finding them transform her life? Were the butterflies a miracle?
- What does Dellarobia think about her new friends, and especially Ovid Byron? What about the scientists—how do they view people like Della, her family, and her neighbors? Does either side see them other realistically?



- Cub and his father, Bear, want to sell the patch of forest where the Monarchs are to a lumber company for clear-cutting. What ramifications would this have, not only for the butterflies but for Della's family and her town? Why is it often difficult for people see the long-term effects of their immediate actions?
- Flight Behavior illuminates the conflicting attitudes of different classes towards nature and the idea of climate change. How does each side see this issue? Where do they find common ground?
- Flight Behavior interweaves important themes: religion and science, poverty and wealth, education and instinct or faith, intolerance and acceptance, How are these themes used to complement each other and how do they conflict?

The Wright Brothers

By David McCullough

The #1 *New York Times* bestseller from David McCullough, two-time winner of the Pulitzer Prize—the dramatic story-behind-the-story about the courageous brothers who taught the world how to fly—Wilbur and Orville Wright.

Orville and Wilbur Wright were men of exceptional courage and determination, and of far-ranging intellectual interests and ceaseless curiosity. When they worked together, no problem seemed to be insurmountable. Wilbur was unquestionably a genius. Orville had such mechanical ingenuity as few had ever seen. That they had no more than a public high school education and little money never stopped them in their mission to take to the air. Nothing did, not even the self-evident reality that every time they took off, they risked being killed.

Discussion Questions

1. The Wright family circle—especially Sister Katharine and Bishop Milton Wright— influenced Orville and Wilbur and their achievement. Upbringing and genetics both play roles in individual accomplishment. To what extent are all of us shaped by our family environment? How much of our accomplishments are fully our own?
2. What goes into making genius like the Wright brothers exhibited, aside from sheer intelligence? Consider traits such as perseverance, focus, and energy. What else? What about the role of imagination?
3. Why was the story of the Wright brothers' achievement so unlikely? Talk about the hardships, knowledge deficits, and other obstacles they had to overcome in order to get their invention off the ground, so to speak.
4. In 1908, when the Wrights finally showed their plane to the press, one reporter wrote: "this spectacle of men flying was so startling, so bewildering to the senses...that we all stood like so many marble men." Imagine yourself in that situation: how might you have



reacted? Can you think of a future technological advancement that might astonish you the same way?

How Enlightenment Changes Your Brain: The New Science of Transformation

by Andrew Newberg and Mark Robert Waldman

In this original and groundbreaking book, Andrew Newberg, M.D., and Mark Robert Waldman turn their attention to the pinnacle of the human experience: enlightenment. Through his brain-scan studies on Brazilian psychic mediums, Sufi mystics, Buddhist meditators, Franciscan nuns, Pentecostals, and participants in secular spirituality rituals, Newberg has discovered the specific neurological mechanisms associated with the enlightenment experience--and how we might activate those circuits in our own brains. In his survey of more than one thousand people who have experienced enlightenment, Newberg has also discovered that in the aftermath they have had profound, positive life changes. Enlightenment offers us the possibility to become permanently less stress-prone, to break bad habits, to improve our collaboration and creativity skills, and to lead happier, more satisfying lives. Relaying the story of his own transformational experience as well as including the stories of others who try to describe an event that is truly indescribable, Newberg brings us a new paradigm for deep and lasting change

Discussion Questions

1. The authors discuss their brain scan studies on Brazilian psychic mediums, Sufi mystics, Buddhist meditators, Franciscan nuns, Pentecostals, and participants in secular spirituality rituals. Which studies did you find the most interesting? Why?
2. How does science contribute to our understanding of enlightenment? Do you think there are aspects of enlightenment that science can't address?
3. The authors present different perspectives on enlightenment. Andrew Newberg is a neuroscientist at Thomas Jefferson University Hospital (Pennsylvania), and Mark Robert Waldman is a faculty member in Loyola Marymount University's MBA program. How do their perspectives differ? What is the unique contribution of each author's perspective to your understanding of enlightenment?
4. Transformation often involves moving from one form or state into something new or different. What parallels do you see between the transformations described in *How Enlightenment Changes Your Brain* to transformations that were presented in the program video?



Lab Girl

by Hope Jahren

Geobiologist Hope Jahren has spent her life studying trees, flowers, seeds, and soil. *Lab Girl* is her revelatory treatise on plant life - but it is also a celebration of the lifelong curiosity, humility, and passion that drive every scientist. In these pages, Hope takes us back to her Minnesota childhood, where she spent hours in unfettered play in her father's college laboratory. She tells us how she found a sanctuary in science, learning to perform lab work "with both the heart and the hands." She introduces us to Bill, her brilliant, eccentric lab manager. And she extends the mantle of *scientist* to each one of her readers, inviting us to join her in observing and protecting our environment. Warm, luminous, compulsively readable, *Lab Girl* vividly demonstrates the mountains that we can move when love and work come together.

Discussion Questions

1. How did Jahren's upbringing help determine her dedication to science? Consider her father's background as a science teacher and her mother's love of English literature.
2. What do you find most remarkable in Jahren's descriptions of the wonders of the natural world? Consider, for instance, the sheer numbers of the plant world. Or how the willow tree clones itself...or the symbiotic relationship between trees and fungi...or the airborne signals of trees in their perennial war against insects.
3. Describe some of the hardships that make life for any scientist difficult—bucking the status quo, the often-endless waiting for results, the grunt work, or the scarcity of funding.
4. Will you ever take a tree—or any plant life—for granted again?