



Guide to *Pushing the Limits: Rural Gateways* Themes

Pushing the Limits consists of 60- to 90-minute adult library programs, designed to be co-hosted by a librarian and a science partner. The events are something of a community get-together/science café hybrid. The program series is built around the overarching idea that the story of humankind is a story of people pushing their own limits every day, and STEM plays an important role – in both obvious and less than obvious ways.

We hope that after watching the videos and reading the books, that with a little bit of prompting and gentle moderating, you and your audience will engage in rich discussions and a fun evening in which you, and your neighbors talk about science as it occurs (perhaps surprisingly) in your own everyday lives. In the process, your community will increasingly recognize the library as an essential gateway to science.

There are multiple program packages available in the *Pushing the Limits* series, and this document provides information specifically for the four-part *Rural Gateways* series:

Pushing the Limits of Transformation

Pushing the Limits of Tradition

Pushing the Limits of Heritage

Pushing the Limit of Motion

Each Pushing the Limits event is organized around a different theme – in this case, transformation, tradition, heritage and motion. The themes are basic and touch all of our lives, and STEM-related ideas and achievements are a part of them.

Moreover, we all have something to say about these ideas. Who doesn't hold traditions dear or think about their heritage? Who doesn't wish for or foster transformation in oneself or others? Who doesn't move?

The event theme threads through all aspects of its individual program. The mini-documentary videos are what one might call “real people with real stories using real science”. They provide a look at an individual or family using scientific ideas, principles, or technologies to push limits in their own lives. Each video has a “human” side to the theme, showing how the theme also serves as a metaphor for the hero of the video, thereby subtly illustrating and the reinforcing the idea that science is a part of everyday lives. These stories have been chosen for their general appeal and potential relevance to rural adult audiences and, unlike a NOVA-style documentary, the science mainly comes out in the conversations of the people for whom the ideas and technologies are making a difference. Intentional efforts have been taken to integrate the science into part of a larger human story rather than make it the sole focus.

Each program event can be aligned with books (fiction and non-fiction) that touch on the general theme of the event and relate thematically to the video. While the events are meant to expose STEM ideas, the books are not “science books” per se, but with the help of gently nudging by the moderator, can be seen as having science embedded in them, and this is brought out in the conversation. Note that two of the programs in the series come with recommended book lists, while the other two programs leave it to the librarian and science partner to make book selection(s).



The book and videos come at the theme of the event from different perspectives. Part of the facilitation of the event should show how the theme is expressed in the different media, even if in different ways. The local science partner at these events, working with the librarian, should guide the conversations in such a way that the scientific ideas are discussed in a thoughtful, interactive, and nonthreatening environment.

We are aiming to pique the interests of your audiences, and then encourage them to express their curiosity, with the hope that they leave the event engaged and open to explore further and possibly deeper science stories and ideas. To draw in participants other than the already “science converted” we have created marketing tools that appeal to the general public. They describe engaging reading, entertaining videos and lively discussions with others in their community. These topics may hint at science, but in truth they could be (and are) about much more. (Note: recommended books, marketing materials and starting discussion questions are on each Program Unit page at www.pushingthelimits.org)

Pushing the Limits of Transformation

“Transformation” is a universal experience – the child becomes the adult, we meet people and they change our lives and sometimes we change theirs. We work, which for some of us is purposeful transformation of materials or words. What is the process of ‘transformation’?

Science in Everyday Life: Heather Doyle

In this video we meet Heather Doyle: who grew up in a “DIY family” in rural Wisconsin. She has become an artist, teacher, and social activist, who has found a way to use her love of blacksmithing - to transform metal but also to transform her own life as well as the lives of all kinds of people around her. Her life is one of continual transformation and her seamless moving among identities has transformed her into the person she is today. Heather clearly learns by doing and teaches in a learning-by-doing fashion.

What kinds of things influence our personal transformations? How have you transformed others? How and who and what have been the important processes and events and people who have transformed you? Is transformation related to problem-solving? How, why, or why not? Does problem-solving distinguish art from engineering? Are art and engineering related? Is transformation always towards a positive end? Can societies be “engineered”? Were you brought up to “do-it-yourself”? Why is the “DIY” ethos seeing a revival today? Are there ways you use STEM to transform things in your hobbies or art (quilting, scrapbooking, soldering)? Are artists also engineers?

Related STEM Topics

Some STEM topics that are explored around the metaphor of “transformation” include:

Material science: mixing metals

Chemistry: ceramic painting

Physiology: working with metal

Physics: tool working



Pushing the Limits of Heritage

We all benefit from the people and things that have come before us. What does “heritage” mean to you? What did you inherit from your ancestors? How does conserving or restoring native species play into our future heritage?

Science in Everyday Life: Joe and Kristen Souza

Joe and Kristen live in Hawai’i, he’s a native and she’s what is called a **kama’aina** - a lifelong resident of the islands. They are ukulele makers, and their love of history and knowledge of acoustics enable them to make sweet sounding and innovative instruments. The ukulele derives its characteristic beauty from the endemic koa tree—which Joe and Kristen have committed to restoring to the islands. They and their three sons work tirelessly to remove invasives, grow new seedlings and plant trees on their parcel on the Big Island. They carefully harvest seeds from the best trees, and tend them in their greenhouse, to return them to the land. Joe and Kristin look forward to passing on their business and future generations of native forest to their children, and their children’s children..

STEM ideas purposefully inform the Souza’s legacy, in acoustics and plant science – does STEM come to bear on your thoughts of legacy, either purposely or not? How and what will you pass on and will STEM play a part in it? Do you work with the earth – and if so, will that be a part of something that future generations do? Is that important to you?

Related STEM Topics

Some STEM topics that are explored around the metaphor of “heritage” include:

Genetics: Selecting for best trees

Biology: Plant growth

Ecology: Healthy forests and ecosystems

Material Science: Different qualities of woods

Engineering: Computer-driven tools

Archeology: Why we preserve

Pushing the Limits of Tradition

What is tradition? On the surface, it’s the repetition of ritual over time. What is the purpose of tradition? What makes a tradition possible? What kinds of actions take hold as traditions? This program theme explores the idea of tradition – traditions in culture, tradition as a form of teaching, tradition in the guise of repetition that is then hard-wired either into behaviors or thoughts? Where do our traditions come from? What do we get from tradition that transcends the actions? In what sense is training tradition? Are traditions important in your life? Do you have any?

Science in Everyday Life: Bob Boyer

Bob Boyer is the football coach at Beaverton High School in Beaverton, Oregon. He is following in his Dad’s footsteps as a coach and has created many new traditions around the game and activity of football,. From the tradition of the first day run and barbecue to the practice of studying game films and running drills, Bob’s life is about using repetitive practice as a way to win football games and to change lives.



These are traditions that build memories and character, but also traditions that build muscle memory and instinct. In the steady cycle of life and football, we see STEM in the conscious and unconscious learning of the sport, affecting a change in the rituals and thus traditions that make football more than just a game.

What are your traditions? Has STEM affected the way in which you go about them or given you a new appreciation for their importance? Do you play sports? Has STEM changed the way you engage in athletic activities?

Related STEM Topics

Some STEM topics that are explored around the metaphor of “tradition” include:

Neuroscience: repeating information and encoded learning

Psychology: Motivation

Physiology: reflexes, hand/eye coordination, survival strategies

Sociology: healthy societies and teamwork

Mathematics: Pattern recognition

Pushing the Limits of Motion

Motion is one of the signature characteristics of living things. What could be more natural than moving? We mostly take for granted the ability to walk around, stop and start, run or walk. For those of us who do physical labor, motion takes on a very different meaning.

Science in Everyday Life: Darrell Petry

Darrell Petry is an African-American cowboy from the small town of Cheek, Texas. After a successful career as a bulldogger, his recent injury has moved him into a new role as a professional hazer, a teacher, and a full time father. As Darrell has moved through time and space in his life, he has had change his life to accommodate his injuries and age, but with age comes wisdom about how to use and care for his body through an intuitive understanding of physics and physiology.

Do you need to take into account how you move in your work? Are there aspects of your life where you had to learn how to move? Have you ever been injured and had to relearn or change the way in which you move? How does motion change with age and with context? How do we move through life’s stages, and change our purpose?

Related STEM Topics

Some STEM topics that are explored around the metaphor of “motion” include:

Physiology: lean muscle mass, rehab

Physics: stopping and twisting the steer

Animal Behavior: horse training

Psychology: parenting, the “adolescent brain”