Smithsonian

Lemelson Center for the Study of Invention and Innovation: Spark!Lab

The Spark!Lab Experience: For the Inventor in All of Us

Museums and other informal learning settings play a key role in the broader learning ecosystem –providing rich opportunities for free-choice, constructivist visitor engagement and family learning while also sparking cross-disciplinary inquiry habits and other lifelong learning skills.

Spark!Lab, launched in 2008 and located within the Smithsonian's National Museum of American History (NMAH) in Washington DC, is a hands-on invention studio where children and their caregivers create, collaborate, explore, test, experiment, and invent. Designed around rotating themes that connect to NMAH's collections and exhibitions, Spark!Lab's invention challenges incorporate traditional science, technology, engineering, and math (STEM) with art, history design, culture, and creativity. Spark!Lab invites visitors to become inventors by actually experiencing the inventive process:

- **Identify a problem or need (Think It)**
- **Conduct research (Explore It)**
- **Make sketches (Sketch It)**
- **Build prototypes (Create It)**
- **Test the invention (Try It)**
- **Refine the invention (Tweak It)**
- **Market the invention (Sell It)**

Spark!Lab facilitators use inquiry-based prompts to help visitors practice inventive skills.

Spark!Lab At A Glance

- **Informal Hands-on Inquiry-based Invention Space**
- **Founded in 2008**
- **Located within Smithsonian's National Museum of American History**
- **Spark!Lab Network sites across the US + Intl (currently 9)**
- **Spark!Lab serves ~400K visitors annually**
- **Target Audience: Children ages 6-12, and their caregivers**

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Promoting Inventive Identity & Sparking Inventive Habits of Mind

Picture yourself sharing a space with people of various ages and backgrounds, working together to invent a new solution to a problem and having access to tools and materials to make your idea a reality. You're surrounded by and inspired by museum objects, biographical stories, and images of diverse inventors, including several who look like you. Spark!Lab does just that. It puts budding inventors in the driver's seat as problem solvers and challenges them to experience the thrill of invention.

> *"When visitors realize they are problem solvers just like 'real-life' inventors, the relevance of the work they are doing hits home..."*
>
> ***-Zach Etsch, Spark!Lab Lead Facilitator***

Spark!Lab facilitators and volunteers use an inquiry-based approach to support visitors as inventors. Visitors generate ideas, build prototypes, and test and tweak their inventions. Then they have a chance to pitch their ideas by showing how their invention addresses the challenge, sharing the story of their own invention process and highlighting what makes their invention unique.

Interactive elements in Spark!Lab highlight the process of invention rather than just the end product, allowing for many different outcomes and solutions and offering multiple levels of engagement. With frequent theme rotations, Spark!Lab highlights invention as a domain-independent, crosscutting set of skills and habits of mind.

Inventive Traits and Dispositions

Lemelson Foundation's Invention Education Framework highlights eight characteristics of inventive thinking: curiosity, empathy, passion, creativity, resourcefulness, calculated risk-taking, tolerance for ambiguity & complexity, and resilience. Spark!Lab's hands-on invention challenges encourage visitors to develop and express these traits and dispositions – and, further, to practice inventive habits of mind in their everyday lives.

INVENTOR TRAITS & DISPOSITIONS IN INFORMAL ENVIRONMENTS

» Empathy
- *Seeks out ways to understand others' needs and wishes*
- *Welcomes feedback and input from multiple points of view*

» Creativity
- *Generates lots of new ideas - both practical and out-of-the-box*
- *Brings together disparate ideas and unexpected combinations*

» Curiosity
- *Notices problems, opportunities, and challenges*
- *Pays attention to small-scale practicalities and/or large-scale systems*

» Resilience
- *Embraces failure as a learning experience*
- *Remains open to feedback*

» Calculated Risk-Taking
- *Explores new possibilities, including wild or unproven solutions*
- *Feels comfortable and safe taking risks*

» Passion
- *Cares deeply about the problem*
- *Personally vested in the process and the outcome*

» Resourcefulness
- *Solves problems using the resources at hand*
- *Uses parts and materials in new solutions and novel ways*

» Tolerance for Ambiguity & Complexity
- *Sees productive tension in not knowing the answers*
- *Embraces multi-layered facets of a problem while working toward a solution*

Download the Invention Education Framework to learn more

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A family group collaborates on their invention.

Spark!Lab's project-based challenge approach invites visitors to invent around everyday themes, such as "Things That Roll" or "Things That Help Us See." The themes and respective invention challenges provide inspiration, but visitors can identify the problem they want to solve and, from the very first step of Think It!, they begin to brainstorm their own solutions. For example, within the "Things That Roll" theme, visitors might design an adaptive vehicle, invent a new kind of skateboard, or figure out a faster way to cut cookies. Other project examples include challenges to Reinvent the Shopping Cart and Invent a Device that can Move Through a Pipe. When visitors are personally involved in selecting the problems they want to address, they're more engaged, more passionate, more empathetic toward the end user, and more likely to persist through challenges and frustration.

Extending Impact: Find Your Spark

In Spark!Lab, everyone is inventive, and that ethos extends beyond the Smithsonian's National Museum of American History in Washington, D.C. The Spark!Lab Network consists of museums across the U.S. bringing invention education to their family audiences, school groups, and communities. Using Spark!Lab pedagogy and core activities as a base, Network sites adapt and create challenges to connect invention to their specific collections and communities. Just as Spark!Lab's connections to historical inventions serve as a bridge to the present and future at NMAH, Network sites' connections to their local community and its invention and innovation history makes invention education relevant to their audiences and empowers their visitors to make change in their communities. An invention challenge at NMAH focusing on cleaning plastic out of the ocean might, for example, become a challenge to address erosion and runoff in Lake Michigan, while visitors to a Spark!Lab site in Florida might invent new bridge designs. Through the diversity of organizations and audiences served, from science centers and children's museums to historic houses and local history museums, the Spark!Lab Network serves as a community of practice for educators to exchange knowledge, find commonalities in facilitation, and celebrate invention education across diverse organizations.

> ***"Spark!Lab gives children and their parents new ways to explore and discover, ultimately opening their eyes to the possibilities of what they can create and achieve through the process of invention."***
>
> ***-Nancy Halverson, Former President and CEO, The Children's Museum of the Upstate***

Lasting Impact: Everyday Invention

A key goal for the Lemelson Center team is for visitors' inventive journeys to continue beyond Spark!Lab into continuous problem-solving and everyday inventing. Many visitors leave Spark!Lab with a purple inventor's notebook that includes reminders about the steps of the invention process and has blank pages waiting to be filled with ideas, sketches, and endless inventive possibilities.