Create.Connect

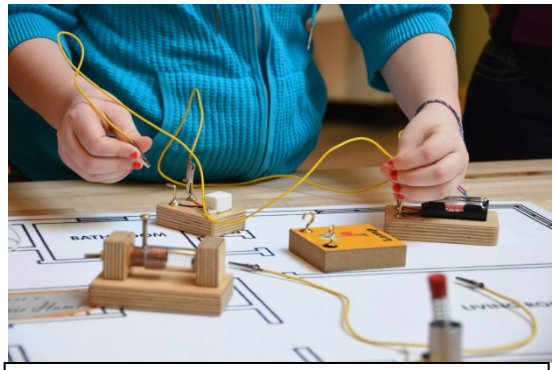
Things to try: Hands-on STEM activities

Each of the areas in *Create.Connect* includes two or three hands-on activities that allow for exploration and experimentation focused on STEM principles. In each space, the STEM topic focus relates to the historical narrative being told; for example, in the section on the rural electrification of Indiana in the 1930's, visitors are experimenting with circuitry and AC and DC power. Each area has two types of STEM activities: make-and-test tables and experiment benches. Make-and-test tables are more open-ended, where visitors can use available materials to construct something, such as a paper glider or a chain-reaction invention, and refine their creation through an iterative process of testing and adjusting. Experiment benches encourage experimentation with STEM principles, but typically require less facilitation. Both types of activities attract visitors' attention, foster prolonged engagement and promote high-quality family conversation on STEM topics.

In *Create.Connect*, we found the STEM activities to be the most frequently visited elements in the exhibition, and the elements that promote the longest stay times. To help balance the history and STEM learning in the exhibition, the *Create.Connect* team employed the following strategies to ensure the activity would reinforce, instead of detract from, the historical narrative.

- **Bring the history into the activity**

  Our first version of the circuit block activity in the Electricity area used batteries, wires and electrical elements like LEDs and fans attached to wooden blocks to make circuits. Wanting to make the history more visible in the activity area, we redesigned the blocks to represent appliances that visitors would then place in the floor plan of a home. Now, while visitors are practicing circuits, we can talk about how families at that time planned the wiring of their own houses.



This circuit making activity was changed to better incorporate the historical narrative.

- **Avoid making false connections**

  In our Wind Power area, we started with a hands-on activity that focused on electrical turbines. Visitors used pieces of wood and cardboard to make miniature turbines to test and see if they would generate electricity. However, staff found it difficult to guide visitors, especially children, through the conceptual steps to understand how what they had built was related to the large Star windmill in the exhibition, which does not produce electricity. Our partners at the Science Museum of Minnesota worked with us to create an activity that demonstrates the physical work that windmills can do. Now the activity is demonstrating the same concept as the historical object.

- **Use the setting to foster connections**

  We found that making a historical, immersive setting in which to house the activity and objects helps connect activity and story. The setting can help give the activity a reason to exist and feel less disjointed. At the Airplane activity, visitors are not just making airplanes out of paper and straws- they are creating aviation models to test new designs.

Ways to find STEM hands-on activities

Partnering with an institution that has expertise in creating hands-on STEM activities is invaluable. Contact a science center or children's museum near you to see if staff there would be willing to partner or consult with you. These institutions are experts at creating hands-on activities and generally have very useful knowledge about best practices. However, as we described above, these activities work best in a history-and-science experience when they are wrapped in the historical context of the story being told. There are also numerous publications available that have ideas for STEM activities. Some examples include:

- Bruman, Raymond, *Exploratorium cookbook I: a construction manual for Exploratorium exhibits*, (San Francisco: The Exploratorium, 1987)
- Hipschman, Ron, *Exploratorium cookbook III: a construction manual for Exploratorium exhibits*, (San Francisco: The Exploratorium, 1993)
- Hipschman, Ron, *Exploratorium cookbook II: a construction manual for Exploratorium exhibits*, (San Francisco: The Exploratorium, 1990)
- Doherty, Paul, and Don Rathjen. *The Exploratorium Science Snackbook*. (San Francisco: The Exploratorium, 1991)