Activity Highlight: Tie-Dye for STEM + Self-Expression

A hands-on project that mixes creativity and chemistry while encouraging students to express themselves and explore real-world STEM connections.

This activity is suggested by WYEN Summer STEM Mentor Lauren Lynde who worked with young people at the Y.E.S. House, a nonprofit agency in Gillette. Learn about her experience at wyoenrichmentnetwork.org.

Facilitator Instructions (For ~10 Participants)

Materials Needed

- 10 white cotton t-shirts (assorted sizes) — or bandanas, socks, or tote bags for variety
- 6-Color Tulip Tie-Dye Party Kit or Rit All-Purpose Dyes
- Plastic or dye-safe tubs or squeeze bottles
- Rubber bands or string
- Plastic table covers or newspaper to protect surfaces
- Gloves (optional, but helpful!)
- Drying racks or clothesline + clips
    - **Tip from Lauren**: *I had to take the shirts home to let them process before rinsing and washing!*
- Reflection or feedback form (optional)

STEM Connection Tips

Science: Talk about color mixing, absorption, and the chemistry of dye reactions on fabric.

Math: Discuss symmetry, pattern creation, and proportions of dye mixtures.

Engineering/Design: Students can “engineer” a design by choosing fold techniques (spiral, accordion, bullseye) and applying dye intentionally.

Tip from Lauren: *We also talked about natural dyes and watched a video of someone making dyes from a bug and a vegetable. This was honestly probably the part they were most excited to learn about. Find the video from BytesizeScience at https://youtu.be/Gwk1B66dvAM?si=JjFrj-CcGGoehf17*

Voice & Identity: Encourage them to reflect on how their design represents something about them — a favorite color, symbol, or feeling.

Before You Begin

Choose an indoor or outdoor space with access to water and good ventilation.

Lay down protective coverings and set up dye tubs/bottles by color.

Preview the activity with the group beforehand — you might show photos of finished examples and talk briefly about how it combines science and art.

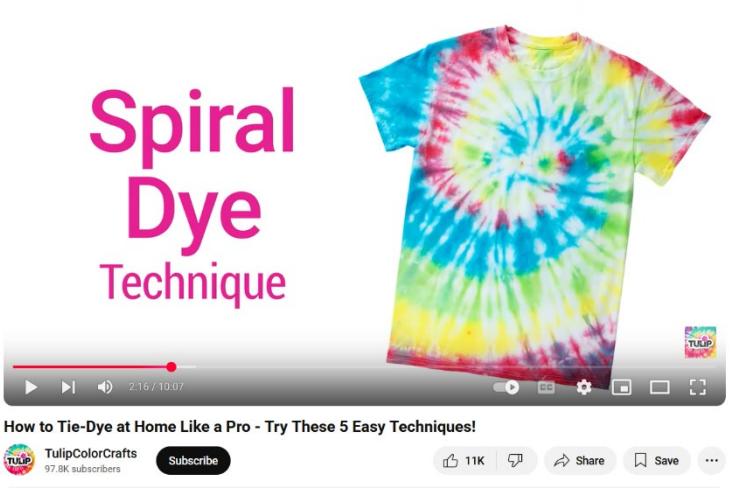
Step-by-Step Instructions

1. Welcome & Introductions

Share names and invite students to share one color they love and why.

2. Set the Stage

Explain the purpose: “We’re doing this activity so you can explore how science, design, and creativity show up in our everyday lives. Tie-dye lets you experiment with chemistry and pattern design while creating something true to you.”



Tip from Lauren: *I showed them this video: https://youtu.be/v-BvyNgrthg?si=Q1Q3idkl-qMAd35h, which made it easy to replay so they could follow along.*

3. Get Started

Hand out shirts or fabric items.

Walk through fold-and-bind techniques (show examples or demonstration).

Mix dye colors and explain the science behind the process (solubility, heat setting, etc…).

Tip from Lauren: If possible, dyeing the T-shirt on a cooling rack prevents the dye from pooling and mixing on the back, helping keep the colors separate.

Let youth choose their own methods and color combinations. Emphasize there's no "wrong" way — just experimentation and discovery.

As students work, engage in conversation:

- "What do you notice about how the dye spreads?"
- "What patterns are you creating? What inspired them?"
- Tip from Lauren: *Ask what colors they chose and why I think colors were the most discussed thing amongst the teens during this activity!*

4. Drying and Clean-Up

Carefully transfer finished items to drying space.

Help students rinse their hands or gloves and clean workstations.

Tip from Lauren: We placed them in grocery bags, let them sit overnight, I took them home and rinsed them with cold water, then washed them on a normal wash cycle.

5. Reflect & Celebrate

If possible, consider taking individual or group photos with their creations.

Invite students to complete a reflection form or share:

- One thing they learned about the science behind tie-dye
- One thing their design represents about themselves
- What they'd like to try differently next time

Optional Extensions

Link to Careers: Talk about how chemistry is used in textiles, fashion design, or environmental science. Insider Tip from Lauren: *This is a good place to talk about cosmetology!*

STEM Next Connection: Tie this activity to the power of near-peer mentorship by having older students lead or co-facilitate.

Elevate Youth Voice: Inviting students to name the activity, write a caption for photos, or post their reflections on a bulletin board or social media.

Thanks to WYEN Summer STEM Mentor Lauren for helping to craft these instructions! Learn more at wyoenrichmentnetwork.org/summer-fellows.