THE tinkering WORKSHOP

By Ryan Jenkins

100 Hands-On STEAM Projects

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teaching tips

Invite kids to play, explore, and invent with screws, wood scraps, plastic pipes, and other found materials for STEAM explorations and connect the project to your educational practice. Each tinkering activity involves science, technology, engineering, art, and math. When students combine these elements, the results are often surprising—and amazing hands-on learning opportunities.

ACTIVITY PREP

Choose an activity. Consider your learning environment space, the materials you have on hand, and your student's interests. You can select one of the material explorations or plan one of the longer projects. Flip through the book for ideas or follow the Activity Ideas below.

Time it right. When selecting your project, think about how much time you have. Consider whether you can schedule a quick bite project, a drop-in space set up in your classroom before the first bell, a 1-hour tinkering workshop during the school day, or a longer-term investigation of materials over several weeks or months.

Try the activity yourself. This will reveal what parts of the process are challenging, interesting, and surprising. Take note of how the scientific and creative process works for you and then use those insights to think about how you might need to change or adapt the experience.

Connect to your current practice. Take a look at the STEAM connections sidebars throughout the book for ideas on how you can connect tinkering projects to your current STEAM lessons, from engineering to technology and math. You can also incorporate videos, readings, and reflective discussions to link the tinkering to your current classroom learning goals.

Go with the flow: A project might lead in unexpected directions, and you might not know the answer to a student's question. That is ok! Try to model how to solve a tricky project, such as making close observations of the mechanics, trying the experiment in a new way, or looking for solutions online. This helps students build problem-solving skills.

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ACTIVITY IDEAS

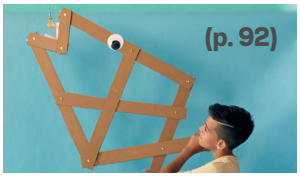
build it kit

For a quick activity, try the build-it kit session with clothespins and straws. Have students work in pairs and share ideas with each other. As you walk around the room, offer suggestions and ideas like:

- "I wonder how tall it can go?"
- "Can you bridge the gap between the desks?"
- "Are there any other ways to attach the pieces?"

Open-ended facilitation supports students in their learning process.

linkage party



Make a free space in the classroom for exploring linkages and the principles of mechanical engineering. Set up a workspace with pre-cut cardboard strips, brass brads, and awls with foam pads. Open the book so the kids can see photos of linkages for inspiration. Tidy up the station when it gets too messy but leave some student-made examples to give others ideas about what to try next.

art robots

If you can set up an hour-long workshop for building art robots, students can go deeper in the tinkering process by building art robots. They will gain experience connecting electronic circuits, robotics, and creating mechanical art. Begin by showing students how to connect a battery and motor. Make a few art robot samples and encourage individual designs. Cover a large table or floor area with white paper so students can make a collaborative drawing with all their homemade Art Robots. Reserve 10-15 minutes for reflection at the end of the session. Ask the kids which parts of the project were surprising, what challenges they faced, and what they felt proud of. This reflective discussion helps them build an identity as a learner and tinkerer.

Wild Windmills

One idea for longer term exploration project can be building wind powered mechanisms. Start by introducing the steps in the "getting started" and "play & explore" sections of the book. Over the course of several sessions, students can work in small groups to create a variety of windmills. They can experiment with changing the size and scale, measuring the wind speed, bringing the contraption outside to see what happens, adding creative extensions, or making the windmill complete a task. Give students time to brain-storm ideas and talk with each other about possibilities. Emphasize the importance of documentation so the final windmill display looks like a portfolio of experiments, some that worked and some that did not.

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