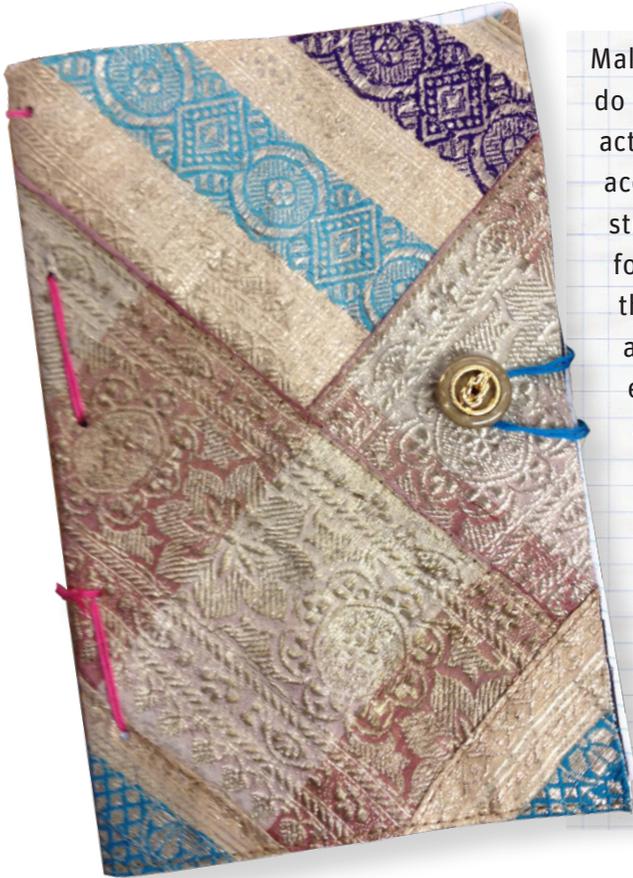


SCIENCE JOURNALS

AFTER-SCHOOL EDUCATOR GUIDE



Making a science journal is always the first activity we do to kick off a new session. It's a good introductory activity because the opportunities for success are accessible enough not to be discouraging for new students, yet the activity is also open enough to allow for infinite variation and personalization. We introduce the journals as a home for questions, plans, stories, and for recording the history of our ideas. We encourage students to write or draw in their journals and avoid making it mandatory to answer a specific question. Rather we try to offer multiple prompts that are open-ended, meaningful and purposeful (see notebook prompt suggestions at the end of this guide). As the introductory experience to the whole series of tinkering activities, science journals can serve the larger purpose of introducing the idea of valuing the process of learning and making.

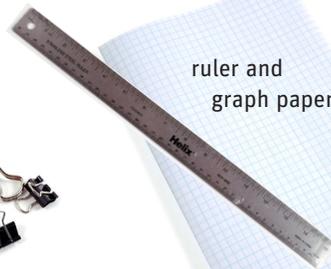
MATERIALS & TOOLS



embroidery needles and thread



binder clips



ruler and graph paper



stitching chisels



leather scraps



mallets or hammers



wooden block



scissors



fabric



buttons

OPENING DISCUSSION PROMPTS

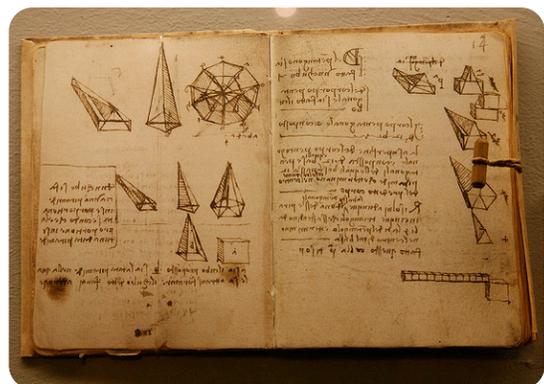
Here are a few example prompts we've used to introduce this activity. We usually sit in a circle and treat this as a time to enter the activity together as we engage young people in a discussion about their questions, ideas, discoveries and plans:



Ask students to think about a favorite picture they have at home or on someone's phone – it could be of family, friends, a pet, a place that they like. It's nice way to have young people learn more about each other and build community. Invite them to consider how photographs allow us to capture, document, and remember our own histories. This discussion can serve as a platform for introducing the role of the science journals as a place to capture the history of their ideas, questions and solutions throughout the process of tinkering. It can also create a context for talking about the value of the process of thinking and learning. The objects or projects we create may be taken apart at the end of the day, but the ideas, recorded in the journals are always with us.

You could also start with a statement about the value of process and follow with a prompt. For example, "Because Tinkering is about trying new things and trying out lots of different possible solutions, today we are going to make science journals. We hope you'll use them to record drawings, ideas, and discoveries you had while tinkering- whether those ideas worked out or not. This way, we all remember what it took to make the things you made and so that we can come back to those ideas later." You could then ask the group:

"Have you ever made something that was temporary that you wish you had a record of? Maybe something you or someone you know cooked and it was really good?" It can be useful to start with your own example to give students time to think of their own and to offer ideas. Such as "I remember making really cool sand castles with my mom once and they got washed away with the ocean. I wish I remembered what they looked like."



Another starting point might be to **share examples from the notebooks of scientists, artists and engineers.** These might be from the Internet, from your own work, or from other members of the community. This could open up a conversation about the role of writing and drawing in science and art, and also be an occasion for bringing in diverse models that students can relate to or recognize themselves in. The drawings and sketches themselves could serve as inspiration for students' own documentations of their inventions. This might also be a nice opportunity to ask students if they know anyone who uses a journal or if they themselves keep a journal – drawing connections to everyday literacy activities.

SET UP YOUR SPACE

There are three general phases to this process: measuring and cutting fabric, hammering holes for binding, and sewing the binding and designs.

If possible, we usually arrange the room in two or three different stations. This helps keep tools and materials centrally located but also for encouraging kids to learn from watching each other as they engage in the same practice or skill.

Tables can be used for spreading out and cutting fabric, hammering is sometimes easier on the floor for smaller kids (or on a table for taller ones), and sewing can be done comfortably sitting on the floor, a rug or a patch of grass.

GETTING STARTED

One of the first opportunities for learning (and for frustration) that tends to come up is imagining how a flat piece of fabric will become a three-dimensional journal cover. This is a good time to ask students what ideas they have or how they want their journals to look. Having the examples nearby allows you to study them together, talk about possibilities, or open them and lay them out on the fabric, etc. Rulers and light colored, washable markers are helpful for planning cuts.



PROCESS PREVIEW

Fold about 5 sheets of graph or blank paper in half to make a folio with 20 usable pages

Choose a fabric for the cover and think about what style the cover will be in order to cut the right size and shape for your design.

Cut the fabric leaving a little extra margin in case you need to trim or adjust later

Place paper folio inside fabric and use binder clips to keep in place

Use chisels and hammer to make binding holes all the way through the fabric and the paper together (this is where the binder clips help keep everything lined up)

Use the embroidery thread and non-pointy embroidery needles to stitch the binding together through the holes. Play with different patterns and styles (see drawings below)

Details & final touches: stitch a design in the cover, add a pocket, make another one for new students, or add a piece of chipboard to the back

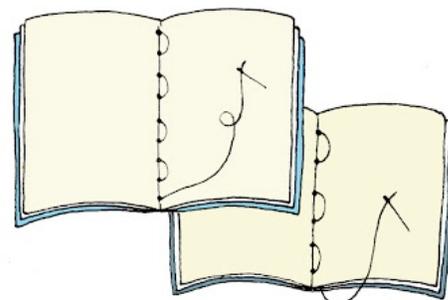
For sewing designs that are in the fabric and not the paper, remind kids they can use one of the pointy embroidery needles and skip the chisel step.

Opportunities for Variation:

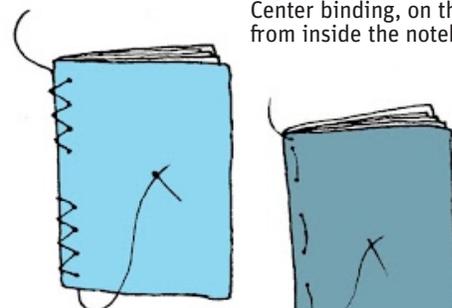
Once the fabric is cut, it's time to decide what kind of binding to use. Here are a few techniques.

There's really no right or wrong way to stitch a notebook. You may notice kids developing creative solutions, which are great to recognize and encourage. This is also a good time to ask students about their ideas as they work and troubleshoot their way through the task.

Learning to thread a needle, anticipating how much thread you'll need to cut, and tying knots are all tasks kids may be learning for the first time. We like to give kids the time and support they need to learn these (seemingly small) tasks and then encourage them to help others once they have. Encouraging kids to support one another also creates an opportunity for relationship and community building.



Center binding, on the fold, from inside the notebook



Side binding, from outside the notebook



For the love of tools:

The stitching chisels we use are tools typically used for leather stitching. We chose them because they get through all the layers of paper well. We always look for authentic tools in order to bring students into real-life and historical making practices. When introducing students to new tools, we often talk about the professions that use those tools. This creates an opportunity for students to think about how everyday objects are made, who makes them and to express their curiosity about the process. By using those same tools, they are invited to momentarily step into the role of book binders. If students are using hammers for the first time, they might need another student to hold the chisel for them to make sure it doesn't jump around. If you find there is a backlog of students waiting to use the chisels, they can also use nails to make holes one at a time.

Complexifying:

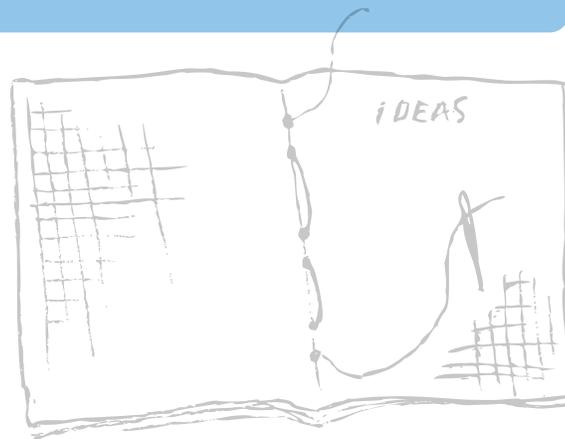
- Sewing their names or designs into the covers
- Sewing pencil pockets on their journals
- Creating ways to fasten the notebook closed, such as buttons with thread loops, flaps with buttons or cloth straps that tie closed.



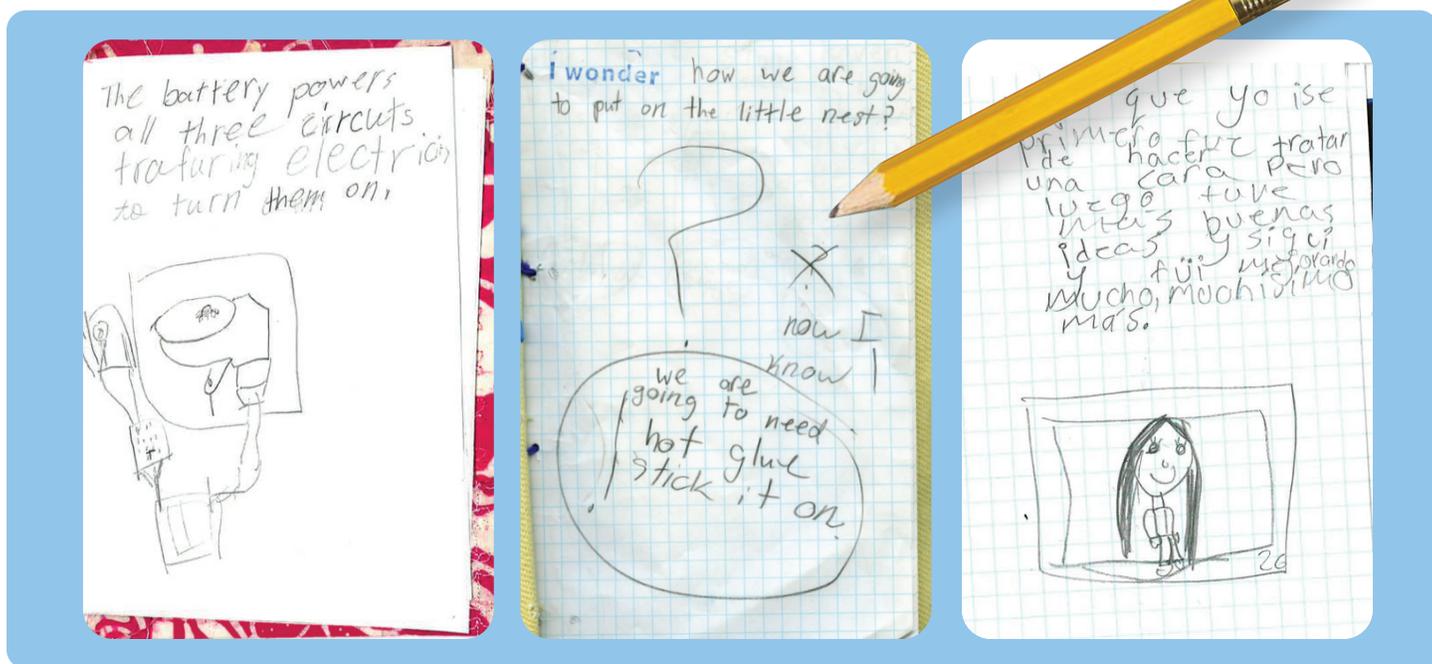
Since it's common in after-school spaces for new students to join after the first session, there will likely be some students who have not had a chance to make their own notebooks. We always ask students who finish theirs early to make extras for kids who join later. You can also use the examples you've made for the same purpose.

SCIENCE JOURNAL PROMPTS

- Did you use any new tools to make your journal?
- What else could you imagine making with those tools?
- When was the last time you saw someone sew?



NOTICING SCIENCE JOURNALS IN ACTION



Look for notebook prompt ideas in our other activity guides!

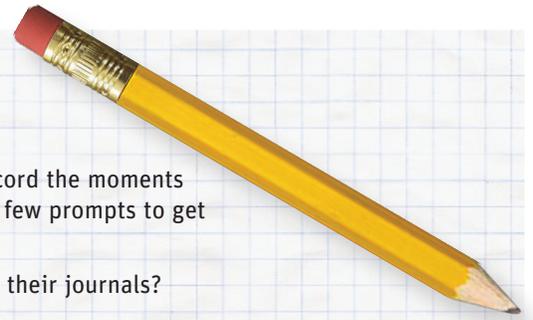
Noticing Learning in Science Journals

These images illustrate how journals can provide a low-stakes context for new ideas and questions. In the second image, the student poses a question that she then answers herself, highlighting the ways writing can provide a rich context for thinking. The student's giant question mark may also highlight the value placed on questions in the after-school setting. The third image reflects the ways students are invited to write and make meaning using multiple languages. In this way, science notebooks also become a context for the development of bi-literacy, one that values the cultural, linguistic and intellectual resources students bring to tinkering.

FACILITATOR DEBRIEF PROMPTS:

Taking time for reflection after a workshop can be a powerful way to share or record the moments of learning you noticed and to brainstorm new ideas to try next time. Here are a few prompts to get you started:

- Did the students surprise you with the designs or methods they used to make their journals?
- What kinds of conversations happened amongst the group while sewing?
- Did you notice any differences in tool use according to gender?
- Describe how you helped students learn to do specific tasks that were new to them- such as using the hammer or threading the needle? Did you see them help other students with the same tasks?



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