Why Low-Tech Making Is Important

Many educators have the misconception that makerspace activities always need to involve expensive technology like 3D printers and circuit kits. Fortunately, this isn’t true. Students can have valuable learning experiences in makerspaces with low-tech and even no-tech tools. Heather Lister shared many such tools in her post on low-tech makerspaces.

Technology is wonderful and amazing, and deep learning can come of it. But there’s also deep learning to be had in a pile of cardboard and a good design prompt, or a skein of yarn and a book on knitting.

Parents, educators, administrators, and other well-meaning adults sometimes dismiss students building with cardboard, toy bricks, or craft supplies as “just playing” or “messing around.” But while students are having fun, deeper learning is also occurring; in fact, research shows that play can lead to intense learning for children. We need look no further than the work of Maria Montessori and Seymour Papert to see examples of pedagogy where play and hands-on activities have integral roles.

Skills Students Learn in Low-Tech Making

Low-tech makerspace activities have the power to activate students’ imaginations in surprising ways while teaching many different skills:

● **Fine motor skills.** As connected as we are to our devices, our fine motor skills sometimes suffer. There is great value in teaching students to build and create with their hands, no matter what their age.

● **Creativity and innovation.** Both of these are considered essential skills by many employers. When you are faced with the limitations of low-tech supplies, you must be more creative to make your project do what you want it to do.

● **Collaboration.** It’s rare to see a student working on a makerspace project in complete isolation. Usually there’s a group of students huddled around a project. Students who do choose to go solo, though, typically ask those around them for ideas and advice. Providing opportunities for students to collaborate like this is crucial.

● **Communication.** When students create a low-tech project, they want to share it. Throughout the guide, you’ll find suggestions for ways students can share their projects, from design pitches to videos and video conferencing to writing and journaling.

● **Critical thinking and problem-solving.** Low-tech activities provide excellent opportunities for students to think critically as they strive to complete their projects the way they’ve envisioned them. Making is all about finding unique design solutions to problems.

Additional Benefits of Low-Tech Making

There are many more benefits to having low-tech activities in your makerspace:

● **Budget-friendly.** In general, low-tech activities are affordable. Often, for example, you can make use of recycled materials or other objects and tools you already have. This helps educators to stretch their budget further and provide rich experiences for their students.

● **Approachable.** Some students find technology intimidating. They might be afraid that they will look dumb if they don’t understand how to use it. For these students, a low-tech activity that involves things with which they are probably already familiar — like toy bricks and craft supplies and taking things apart — is a less-threatening entry into making.

● **Low threshold, high ceiling.** For an activity to have a low threshold, it needs to be something that students can readily grasp and experience early success in. For it to have a high ceiling, it needs to have learning possibilities that reach beyond the basics. Many low-tech activities embody this concept beautifully. For example, your students could achieve quick success by building a basic phone stand with K’NEX. They could then go much deeper by building a complex model, writing up a story behind it, shooting a stop-motion video, and so on. (See the K’NEX Smartphone Holder activity on page 8.)

● **Plays well with technology.** While you don’t need technology to create low-tech maker activities, if you do have tech available, it can combine well with low-tech activities. Students could 3D print a widget that attaches toy bricks to K’NEX. They also could create a stop-motion video using craft supplies. There are all sorts of possibilities.
Makerspace Logistics

As with any activity in a makerspace, some advanced planning can help you have successful low-tech activities without wanting to pull your hair out. Many of these are good things to do for makerspaces in general. But low-tech projects can get especially messy sometimes, so you want to be ready.

Organization

Organize your low-tech supplies in ways that work for you and your space. For example, you might store supplies in clear shoeboxes on shelves or on a makerspace storage cart. Also, consider using a labeling system that works for you and your students. One way to do this is to take a photo of what's inside the shoebox or on the cart, print it out, and tape it to the box or cart. This is also helpful for students who are English language learners.

In addition to organizing your supplies, you'll need a designated space to store student projects. With the exception of make-and-take activities or ones in which students take apart all the supplies when done, you're going to have projects that you'll need to hold on to. Set aside shelves or large storage containers where students can store their projects while they're working on them.

Setup

Before your students arrive for your low-tech maker activity, prepare the space. Often, I put the supplies out on the tables for the students. If you're doing a shorter activity (i.e., all during one class period), putting the supplies out eliminates one more decision that your students have to make and frees up more time for making. Sometimes, though, I let the students go to the shelves or storage cart to select supplies themselves. This gives them a sense of responsibility to the makerspace and ownership of their projects, as well as requires them to think critically about the best tools for their project.

Timing

How long your students will have to work on a project is entirely up to you. Your activity might be after school, when you have more time. It might be during lunch, when you'll be lucky if you have 20 minutes. You might do it in one class session or in several. It might be a drop-in activity with no set time frame. Determine which format works best for your students and the activity at hand. Also, consider telling students that they have less time than they actually do — this helps spur on creativity.

Student Helpers

If you have students who are actively involved in your makerspace, recruit them as your helpers. You might work with these students beforehand to help them learn the new activity or tool. Then when you begin the design challenge, they will be able to help other students with their projects. There's only one of you (and maybe another teacher or volunteer), so having a few students who can help troubleshoot and answer questions helps a lot.

20 Low-Tech Makerspace Projects

On the following pages, you'll find a wide variety of low-tech projects that are sure to get the wheels of creativity turning. Feel free to adapt these project ideas and challenges in ways that work best for you and your students. Every challenge has a suggested age range, but most can be modified to be more or less difficult. The time frame is a suggestion — you can easily make many of these challenges longer or shorter. The supply lists are also suggestions, and quite often you can add or subtract items from them and still have a successful activity. Happy making!
**Makedo™ Cardboard Furniture Design Challenge**  
2–3 hours (adjustable)

This is a fun variation on a furniture design challenge. Cardboard and Makedo combine to allow for fast, large-scale prototyping, which enables students to more easily make their projects to scale. Makedo screws allow students to easily attach cardboard pieces together. They can also use them to create moving joints.

This is a more complex design challenge that will likely need to be spread out over several sessions. Be sure to identify a space in which to store prototypes.

**Challenge:** Design an item of furniture for your ideal learning space.

**Skills:** Fine motor, design, creativity, engineering

**Age:** Middle and high school

**Supplies:**
- Cardboard
- Cardboard cutter (Makedo saws work well for younger students. Look for electric cardboard cutters for older students.)
- Scissors
- Makedo (to create moving parts and attach pieces)
- Packing tape
- Hot glue guns and glue sticks
- Acrylic paint and paintbrushes
- Aluminum foil
- Any other recycled materials or craft supplies you have

**Steps:**
1. Start by presenting the challenge: What’s one problem with learning spaces that you’d like to solve? How can you make your classroom/library/makerspace more efficient or easier to navigate? What kind of furniture could do this?
2. Students could create chairs, tables, storage carts, stools, or any other type of furniture for this challenge. Encourage them to ask questions, observe how other students use the space, brainstorm ideas, and draw out sketches before beginning to build their prototypes.
3. When the designs are finished, ask some educational furniture companies if they’d be willing to video-conference with your students and offer feedback. In addition, consider putting together a gallery of creations with artist statements from the students.

**The Cardboard Creature Challenge**  
1–2 hours

The Cardboard Challenge has long been one of my favorite makerspace activities. Inspired by the amazing short film Caine’s Arcade and the Imagination Foundation’s Global Cardboard Challenge, I’ve created a new variation on this challenge every year, such as arcades, robots, and buildings. This Cardboard Creature Challenge takes it to a new level.

**Challenge:** Create a character out of cardboard that does something.

**Skills:** Fine motor, design, creativity, engineering

**Age:** All ages

**Supplies:**
- Cardboard
- Cardboard cutter (Makedo saws are great tools for younger students. Look for electric cardboard cutters for older students.)
- Scissors
- Hot glue guns and glue sticks
- Makedo (to create moving parts)
- Packing tape
- Acrylic paint and paintbrushes
- Aluminum foil
- Plastic wrap
- Rubber bands
- Googly eyes
- Any other recycled materials or craft supplies you have

**Steps:**
1. Begin by having students watch Caine’s Arcade together.
2. Explain how to safely use any supplies and materials you have available.
3. Introduce the design prompt to students, and then watch the magic happen. I recommend a shorter time frame for this project (1–2 hours) as cardboard projects can get messy very quickly.
4. Students often have stories behind their creatures. Consider these options for sharing their projects:
   - Create a video compilation of students sharing the stories of their creatures.
   - Have students write blog posts about their creatures.
   - Ask students to write a short “artist’s statement” about their creatures and then display them gallery-style.
Tech Take-Apart Robot
2–3 hours
Tech take-apart is a classic makerspace activity. In this design challenge, students take it a step further by building a robot with recycled technology. This project doesn't have to be super complex — picture a shoebox that has been painted black with keyboard keys and circuit boards glued to it.

I recommend spanning this activity over three sessions or class periods, but you can adjust as needed. In the first session, students will spend the time taking apart the tech and salvaging pieces for their designs. In the second session, they will focus on brainstorming and creating their robots. In the final session, students can write stories or create videos about their robots and share them with the class.

**Challenge:** Build a robot using recycled parts from old technology.

**Skills:** Fine motor, design, creativity, engineering, technology

**Age:** Upper elementary (with supervision) through high school

**Supplies:**
- Several different types of technology that are relatively easy to take apart, such as broken computers, keyboards, alarm clocks, VCRs, and so on.
- Safety goggles for students to protect their eyes
- Gloves
- An assortment of tools, such as screwdrivers, pliers, etc.
- Hot glue guns and glue sticks
- Craft supplies for students to use with the recycled tech, such as cardboard, boxes, paint, etc.

**Steps:**
1. For safety, cut off the power cords before allowing students to tackle the tech.
2. Explain how to safely take apart technology before letting students loose. Depending on the age of students, you might need to do some prep work ahead of time to remove some pieces that are harder to get to.
3. Set — and discuss — consequences for abusing the tools. You might even outline the rules on a handout that you ask students (and their parents) to sign.

Recycled Book Art Gallery
1–2 hours
We have all weeded out damaged or old books from our libraries or classrooms. Instead of throwing them away, why not transform them into recycled art? Provide students with a variety of arts and crafts supplies, and see what they create! Teach students what an artist’s statement is, and have each write one up when his or her project is complete. Then display all the students’ projects, and invite classes to visit for a “gallery walk.” This is a fantastic (and fun) way to introduce students to the world of professional art as well as to recognize their work.

**Check out this link** to see how I hosted a Recycled Book Art workshop at my school and see my list of recommended books on book art.

**Challenge:** Transform an old book into a work of art and write an artist’s statement explaining your process.

**Skills:** Fine motor, design, creativity, paper cutting and folding

**Age:** All ages

**Supplies:**
- A variety of discarded books, including children’s, paperbacks, hardcovers, fiction, nonfiction, dictionaries, etc.
- X-Acto® knives (middle school and up only, with supervision)
- Mod Podge® and foam brushes (ventilation may be needed in small spaces)
- Regular scissors
- Fancy craft scissors
- Glue sticks
- Sharpie markers
- Colored pencils
- Bone folder

**Steps:**
1. To narrow the focus of the activity, choose a theme (such as travel, nature, animals, etc.) or a specific project (such as folded book page art, necklaces made from rolled paper “beads,” collage, etc.) ahead of time. Determining a theme or project beforehand prevents students from feeling overwhelmed with the possibilities and allows you to repeat this activity several times with different themes or projects.
2. Browse Pinterest and the recommended resources in the link above to gather inspiration for your students.
3. Share some ideas (related to the theme or project) with your students, and then guide them in their creativity.
**Recycled Book Art Buttons**

1–2 hours

Students love to share the things they are passionate about with others. Making buttons out of recycled books is a fun and creative way for them to express their interests, especially their love of reading. For example, they could share a favorite passage from a Harry Potter book, their own poetry, an illustration from their favorite manga, or other images. The possibilities are as varied as your students' passions!

**Challenge:** Turn your favorite passage or image from a book into a button you can wear.

**Skills:** Design, creativity, paper cutting, literacy

**Age:** All ages (with adult help for younger students)

**Supplies:**
- A variety of old books, including paperbacks, hardcovers, fiction, and nonfiction
- X-ACTO knives (middle school and up only, with supervision)
- Mod Podge and foam brushes
- Regular scissors
- Sharpie markers
- Colored pencils
- Button maker and button supplies

**Steps:**
1. Have students choose a few passages (which could include something they’ve written themselves) that they feel represent them or express their interests.
2. Give students a button template, so they know the size and shape their passage or image must fit in. Note: If you have a copier available, shrink or enlarge images to better fit the template.
3. When images are the correct size, follow the instructions included with the button maker to create the custom buttons.
4. Ask students to don their creations, then take a photo of the group to put up in your makerspace!

**Duct Tape Wallet**

1 hour

The duct tape wallet is a classic old-school craft that tweens and teens will love. After mastering a basic duct tape wallet, many students will advance to creating more complex ones or other duct tape creations.

**Challenge:** Use duct tape to create a wallet that can hold cash and cards.

**Skills:** Fine motor, design, creativity, geometry, reading instructional materials

**Age:** Upper elementary through high school

**Supplies:**
- Duct tape (in a variety of colors and patterns)
- Scissors (made specifically for duct tape if possible)
- Clear packing tape (if students want to create an ID window or secure duct tape without altering the pattern)
- Sharpie markers

**Steps:**
1. Prior to the activity, search online and in books for tutorials on making duct tape wallets. Determine a few in which directions are clearly stated or written and steps are easy to see.
2. Allow students to view the tutorials you’ve selected to find the one that makes the most sense to them.
3. Assist students as needed with deciding on a pattern, understanding the steps, and cutting the duct tape.
**Perler™ Bead Pixel Art**

**1 hour**

This project is a classic craft with a modern twist — creating pixel art! Perler beads are tiny beads that you arrange on a pegboard, cover with waxed or parchment paper, and then melt together using an iron. Students learn about design and how colors work together to create an image.

**Challenge:** Use Perler beads to create pixel art of one of your favorite characters (or make up your own character).

**Skills:** Fine motor, design, creativity, color theory

**Age:** Upper elementary through high school

**Supplies:**
- Perler beads
- Pegboards
- Waxed or parchment paper
- Iron (with adult help for younger students)
- Color printer (helpful for printing patterns, but not necessary)

**Steps:**
1. Print out images (in pixel art form) of several popular video game and movie characters in advance.
2. If students want to create different characters than the ones you’ve chosen, help them find some images online or pixelize a photo of their own created character using an app or graph paper.
3. Assist students as they arrange the Perler beads on the pegboards using the printed images to guide them.
4. When an image is completed, cover the beads with waxed or parchment paper.
5. Run an iron set at medium heat slowly over the image in a circular motion, taking care not to knock any beads out of place.

**Perler Bead 3D Sculptures**

**1–2 hours**

Perler beads are usually used to create flat 2D images, but why not make 3D shapes out of them? A quick search of Pinterest will yield plenty of patterns, ideas, and inspiration for creating 3D shapes out of Perler beads.

**Challenge:** Use Perler beads to create a 3D sculpture by attaching multiple sides or pieces together.

**Skills:** Fine motor, design, creativity, color theory, geometry

**Age:** Upper elementary through high school

**Supplies:**
- Perler beads
- Pegboards
- Waxed or parchment paper
- Hot glue guns and glue sticks
- Iron (with adult help for younger students)
- Color printer (helpful for printing patterns, but not necessary)

**Steps:**
1. Peruse Pinterest for ideas and inspiration. If time and group size allow, invite your students to look for patterns with you.
2. Create one side or piece at a time, following the steps outlined in the Perler Bead Pixel Art activity.
3. Using a hot glue gun, students glue together the 2D images they made. Alternatively, students can create slots throughout their designs so that the pieces fit together like a 3D puzzle.
**K'NEX Smartphone Holder**

1 hour

This is one of the first design challenges I created, and it remains one of my favorites. The first time I did this with my students, we had just acquired Apple iPod® Touches for the library. Students were excited to test out the devices and eagerly built all sorts of tripods and holders for making our videos.

Since that first challenge, I've used variations of this prompt with classes, clubs, and educators. Students love this challenge because it allows them to bring out their devices. And, it is a great maker icebreaker!

**Challenge:** Use K'NEX to create something that can hold a smartphone to take a picture or video, such as a tripod, stand, or selfie stick.

**Skills:** Fine motor, design, creativity, critical thinking

**Age:** Upper elementary through high school

**Supplies:**
- K'NEX
- Electronic devices (smartphone, tablet, etc.)

**Steps:**
1. In advance, set out on a table (or tables, depending on the size of your group) as many K'NEX parts as you have available.
2. Explain the challenge to your students: Create a “tool” that can hold a smartphone or tablet to take photos or videos. Some fun and useful tools could include selfie sticks, tripods that swivel, and dollies on wheels.
3. To get students prototyping quickly, offer them less time to get started. You can always add more time if students need it.
4. If you find the activity needs to last longer, include the creation of a video in the time frame and have students share what they made or filmed.

**K'NEX Building Model**

1 hour

In this activity, students use K'NEX to create models of real buildings and landmarks. The most difficult part of this challenge is getting students to accept that their models don’t need to look exactly like the buildings they’re modeled after. I offer up an hour for this one because it takes more time to really brainstorm, plan, and create a model like this.

**Challenge:** Use K'NEX to create a model of an existing building or structure.

**Skills:** Fine motor, design, creativity, critical thinking

**Age:** Upper elementary through high school

**Supplies:**
- K'NEX
- Printouts of buildings or structures

**Steps:**
1. Choose a theme. For example, a design challenge like this could work well in connection with a social studies, geography, or history class that has a unit on a particular region. Students could build models of the pyramids and Sphinx for an Egypt unit or the Eiffel Tower in French class. Students could also connect these models with the mathematics of architecture and engineering. Another option is to offer this challenge just for fun during a club meeting. Choosing a theme (even if it’s “just for fun”) also allows you to repeat this challenge with a different focus each time.
2. Search online and in books for clear images of interesting or well-known buildings and landmarks. Depending on the size of your group, you might do this ahead of time. Alternatively, you can allow students to search themselves for models they want to build.
3. In advance, set out on a table (or tables, depending on the size of your group) as many K'NEX parts as you have available.
4. Remind students that their models will not look identical to the images they see; the challenge is to replicate the structure with different building materials.
**K’NEX Race Cars**  
1 hour

Students love to make things that move fast, so why not challenge them to create race cars and other vehicles? As students create and test out their vehicles, they’ll gain an understanding of things like aerodynamics, weight and drag, and how they affect their vehicle.

I would caution against turning this activity into a competition. Building vehicles isn’t about winning or losing or whose is the fastest or the best. You want to establish an environment of collaboration where students are focused on being creative rather than competitive.

**Challenge:** Use K’NEX to create drag racers or other vehicles. Build a ramp out of cardboard and chairs to race them down.

**Skills:** Fine motor, design, creativity, physics, aerodynamics

**Age:** Upper elementary through high school

**Supplies:**
- K’NEX
- K’NEX wheel sets
- Cardboard or other material to create a ramp

**Steps:**
1. Search online and in books for images of race cars and drag racers. Depending on the size of your group, you might do this ahead of time. Alternatively, you can allow students to search themselves for the cars they want to build.
2. In advance, set out on a table as many K’NEX parts and wheels as you have available.
3. If possible, create a ramp (out of cardboard or other materials and a chair or stack of books for height) for students to run their vehicles down. They can also try racing them down a hallway.
4. Have students document their observations as they work on their creations.

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**Rubber Band Launcher**  
1–2 hours

This is a super-fun activity that students love. While working on this project, students will learn a lot about what types of materials are dense enough to support a rubber band, how different thicknesses of rubber bands affect their creations, and how much force they can create.

**Challenge:** Use K’NEX, recycled materials, or other supplies to create a device that can launch a rubber band or that can launch something with a rubber band.

**Skills:** Fine motor, design, creativity, critical thinking

**Age:** Middle and high school

**Supplies:**
- K’NEX
- Various recycled materials
- Lots of rubber bands

**Steps:**
1. With this kind of challenge, set a few ground rules right away:
   - Never point your device at another student EVER. Obviously, students might be tempted to test out their devices on other students. Explain that this is never allowed and clearly state the consequences.
   - Create a test-launch range. Create a specific zone in the room or hallway where students can try out their creations without risk of harming others or causing damage to the space.
   - Medieval weapons are fine, but no guns. This one is optional. I personally am not comfortable having my students make fake guns and fire them at school.
2. For more resources for your students, the book series Mini Weapons of Mass Destruction is helpful. Share with your students the few resources you think are most creative and useful.
3. In advance, set out K’NEX parts, recycled materials, and more rubber bands than you think you’ll need. If you have the space, put some of each supply on two tables, so students aren’t crowding around just one.
4. Ask students to take notes during the creating process and to record their observations during the testing phase.
5. Be sure to allow time for students to share what they learned and observed during the challenge.
Strictly Briks® Creature Home
1 hour
Many makerspace projects can help students to build empathy. In this scenario, students are working from the perspective of a creature and trying to understand what its needs are. The beauty of this design challenge is that it offers so much space for creativity. Some students might be more literal and think of basic needs, like a bed and a kitchen for their creature. Others might be more imaginative, such as creating a sofa so that their creature can watch television. Your students’ personalities will shine through their projects.

Challenge: Build a home for a creature (real, imaginary, figurine, etc.) using Strictly Briks.

Skills: Fine motor, design, creativity, critical thinking

Age: Elementary and middle school

Supplies:
- Strictly Briks set
- Strictly Briks construction baseplate

Steps:
1. Consider choosing a theme for the challenge. For example, the creature could tie in with curriculum (i.e., a science lesson about a certain animal), be featured in a picture book, or just be fun and whimsical. You could use stuffed animals or figurines to represent the creature.
2. Discuss the meaning of the word empathy. Ask students to share examples of times when they felt empathy themselves or saw someone else demonstrating empathy.
3. Set out Strictly Briks sets on tables, and give each student a baseplate. Allow enough room for students to build and create without feeling crowded.
4. A good way for students to share projects is to have them create a video (or film them yourself) explaining how the home will provide the creature with things such as comfort, shelter, entertainment, and so on.

Strictly Briks Dream Playground
1 hour
What kid doesn’t love a playground? For this activity, encourage your students to think about their favorite playgrounds. What makes the playgrounds so special? If they could create their dream playground, what would be in it — climbing walls, obstacle course, trees? The possibilities are endless!

Challenge: Build your dream playground using Strictly Briks.

Skills: Fine motor, design, creativity, critical thinking

Age: Elementary

Supplies:
- Strictly Briks set
- Strictly Briks silicone bricks and straps
- Strictly Briks construction baseplate
- Yarn (for creating swings)

Steps:
1. In advance, set out the Strictly Briks pieces on tables. Allow enough room for students to build and create either independently or in groups.
2. To encourage resourcefulness, ask students what supplies they might use to build different structures on their playgrounds. Give them a minute to think (don't be afraid of silence — it can help to jump-start the creativity engine!), then demonstrate their ideas using the supplies. For example, a silicone strap works well for a slide, and a strand of yarn snapped between bricks becomes a swing. Jot down ideas on a whiteboard so all the students can refer to them.
3. When all individuals or groups are finished building their dream playgrounds, hold a gallery walk so the students can view all the creations. You might also film a video that features all the playgrounds or even hold a video conference with another school to share students’ imaginative endeavors.
KEVA® Plank Bridge
45 minutes
This is a fun design challenge with many possible variations. Encourage students to manipulate planks to experiment with different engineering concepts, such as cantilevers.

Challenge: Create a bridge out of KEVA planks to help your character cross a river.

Skills: Fine motor, design, creativity, engineering

Age: Elementary

Supplies:
- KEVA planks
- Blue painter’s tape or something else to represent a river
- Figurines, dolls, or action figures to represent characters

Steps:
1. Set out supplies on tables. Be sure to provide enough surfaces for students to build on to help prevent tables getting bumped and structures toppling. Depending on the number of students present, have students work independently or in groups.
2. Help students create “rivers” with painter’s tape or some other material. You might want to make multiple rivers on multiple tables.
3. Give each student or group a character (figurine, action figure, etc.). Then tell them that their character is stuck on one side of the river and doesn’t know how to swim. Challenge students to build a bridge so their character can cross the river.
4. When each individual or group completes a bridge, have the students test it by setting their character on the middle of the bridge. If the bridge collapses, ask them to consider why and then to try again. Once they’ve built a successful bridge, extend the challenge with these variations:
   - Your character needs to cross the river but has only 10 KEVA planks! Can you build a bridge that supports her?
   - Your character wants to bring some friends with him across the river. Can you build a bridge strong enough to hold multiple characters at one time?
   - Add a railing to your bridge to make it safer.

KEVA Plank Tower
45 minutes
This challenge could easily tie in with a picture book that features a tower or with a social studies unit on medieval castles. It can also be modified to be as basic or as advanced as you want. For instance, you could have students simply build towers with KEVA planks, or you could add a design constraint (or theme) to make the activity more challenging.

Challenge: Create a tower out of KEVA planks.

Skills: Fine motor, design, creativity, engineering

Age: Elementary

Supplies:
- KEVA planks

Steps:
1. Set out KEVA planks on tables. Be sure to provide enough surfaces for students to build on to help prevent tables getting bumped and structures toppling. Depending on the number of students present, have students work independently or in groups.
2. Decide in advance if you will add a design constraint or theme to the challenge.
3. If you are adding a theme, search online or in books for images of towers (on castles, bridges, etc.) and print out the ones that are most appropriate for your group.
4. If you are adding a design constraint, consider these ideas:
   - Create a platform at the top of your tower so your character can watch for pirates.
   - Add a balcony.
   - Build two separate towers and connect them together.
   - Build the tallest tower you can with only 20 planks.
Strawbees® Flying Machine
1 hour

The light weight of Strawbees makes them ideal for creating flying machines. Because the materials aren't precious, students can feel okay about cutting, gluing, and manipulating them in different ways to create.

Challenge: Create different flying devices out of Strawbees.

Skills: Fine motor, design, creativity, engineering, aerodynamics

Age: Elementary and middle school

Supplies:
- Strawbees connectors and straws
- Tape
- Various lightweight craft and recycled materials, such as paper towel tubes, tissue paper, newspaper, feathers, etc.

Steps:
1. Set out Strawbees connectors and straws. Allow enough space for students to build and create without feeling too crowded.
2. With students, brainstorm types of flying machines. These can be anything from kites to airplanes to hot-air balloons and anything in between. Jot ideas down on a whiteboard so all students can refer to them.
3. This design challenge can have many variations. You could build a wind tunnel (directions here) and have students create and test different flying machines in it. You could use a regular fan and see what it does to your creations. If you have access to a second-floor balcony, students could drop or launch their creations from there and observe what happens.
4. At the end of the session, ask students to share what they observed while building and testing their machines.

Strawbees Habitat/Shelter
2–3 hours

This challenge is similar to the Strictly Briks Creature Home Challenge. The difference is that, with Strawbees, students can prototype larger and faster. This opens up the possibility of creating larger habitats for creatures or shelters for humans.

Challenge: Using Strawbees, create a large animal habitat or a shelter for small humans.

Skills: Fine motor, design, creativity, engineering

Age: Elementary and middle school

Supplies:
- Strawbees connectors and straws
- Tape
- Various lightweight craft and recycled materials, such as paper towel tubes, tissue paper, newspaper, feathers, etc.

Steps:
1. Large-scale projects like this require more space and time, so be sure to provide plenty of each.
2. Set out Strawbees connectors and straws as well as tape on tables in advance.
3. Consider connecting this challenge with a science lesson related to animal habitats and ecosystems. For example, students could use Strawbees to create forests, caves, coral reefs, and so on.
4. Alternatively, students could create different types of shelters for humans, such as tents for camping, storm shelters, yurts, igloos, and so on.
5. As this challenge lends itself especially well to storytelling, allow enough time for students to share and talk about their creations.
Passive Maker Stations

It’s important to incorporate simple maker stations into your makerspace. A passive maker station is a drop-in activity set up in the makerspace that students can do without much supervision. These help to balance out open exploration and more focused design challenges and workshops. They also help to nurture a culture of creativity in your space.

Origami Bookmarks and Geometry

Origami bookmarks are a fantastic way to create a passive maker station in your makerspace. The bookmarks already include instructions on the paper, making it easy for students to follow along. Once students have success with the bookmarks, they might be inspired to try other projects or to create designs of their own.

**Challenge:** Fold paper into an origami bookmark and identify what shapes are in it.

**Skills:** Fine motor, design, creativity, geometry

**Age:** Elementary and middle school

**Time frame:** 20 minutes

**Supplies:**
- Origami paper and bookmarks
- Books on origami

**Steps:**
1. Purchase bookmark kits and standard origami paper in advance. Be sure to keep a good supply of paper on hand—this tends to be a popular activity!
2. Set out origami bookmark kits, paper, and books on tables in your space.
3. To add a curriculum twist to this activity, include a whiteboard near the station (or a poster board with sticky notes), and ask students to identify the shapes used as they work on their designs.

Color Craze Bookmarks with Design Constraints

Color Craze bookmarks are a whimsical way to get students into a creative mindset without too much oversight. The best part about this make-and-take activity is that students get to bring their finished creations home with them and use them to mark pages in their favorite books.

**Challenge:** Decorate a Color Craze bookmark with a design constraint, such as only using blue shades of crayons, pastel colored pencils, or neon gel pens.

**Skills:** Fine motor, design, creativity, art theory

**Age:** All ages

**Time frame:** 30 minutes

**Supplies:**
- Various Color Craze bookmarks
- Art supplies such as crayons, colored pencils, gel pens, markers, paint, etc.

**Steps:**
1. Set out a variety of Color Craze bookmarks and art supplies in your makerspace.
2. To make the activity more challenging, add a design constraint. For example, you could put out only various shades of blue pens, crayons, and colored pencils (a blue-ful way to connect with Picasso’s Blue Period). Or, you could provide only black markers and challenge students to find a way to use negative and positive space.
3. Consider putting out themed bookmarks and art supplies in seasonal colors, such as brown, gold, orange, and green for fall or primary colors for back-to-school time.

StickTogether® Mosaics

StickTogether Mosaic posters are fun passive maker activities. There are several posters of works of art that you could tie in to an art history unit as well as of animals that could connect with picture books. They also work well to bring students into the library or makerspace who don’t often visit. Taking part in this collaborative art project brings a sense of community, contribution, and collaboration.

**Challenge:** Add stickers to the StickTogether Mosaic Puzzle Poster, and watch as the image comes together.

**Skills:** Design, art theory, color

**Age:** All ages

**Time frame:** N/A

**Supplies:**
- StickTogether Mosaic Poster

**Steps:**
1. Decide if you want to connect the poster to a theme, such as art or animals.
2. As an incentive, consider issuing stickers when students have reached a predetermined goal, such as a certain number of pages read or an amount of books checked out.
3. You could put out only one color at a time to help students understand the roles different colors play in an image.
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