



Think Make Create

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# The Makerspace Playbook

Issue #28: January-March 2024

## TMC ON THE MOVE: THINGS TO CONSIDER

We have archived articles about prepping your trailer for the seasons (Oct 21, Apr 22, Jul 22, May 23), and managing inventory and supplies (Sept 21, Mar 23), but another thing to consider as we enter a new programming season is how to keep things fresh and exciting! This isn't just relevant for the kids, but for us as educators as well.

I just purchased a small collapsible seat to work around in my trailer and I am really excited about it. No more kneeling or squatting! It's the simple things.

Have you added an activity the kids haven't done in a while? Perler beads are very flexible to integrate with different subjects (like coding) or to just let the kids free play. I also just bought an iron bag and iron mat for easy transport.

Create some activity totes that you can share with an educator friend. Gardening in paper pots and desktop greenhouses are fun, and often activities you can do inside or out. We love using Junior Master Gardener or Ag in the Classroom. They have a huge variety of free lessons that span across all ages. Most of the materials are easy to access and not too expensive. This month we are building an origami/pipe cleaner flower and dissecting lilies.

*~Claire Sponseller, Area Extension Educator,  
University of Idaho 4-H*



## Spotlight on You: STEM Week with Lemhi County 4-H

In November 2023 the small, rural towns of Salmon and Leadore, Idaho lit-up (literally!) with STEM education, thanks to Taylor Smith and Shannon Williams of University of Idaho Extension 4-H of Lemhi County. They reached almost every kid in the county with STEM lessons during STEM Week. They modeled the week of education after Ag Week, a 4-H tradition. Using their TMC Lab and community partners, they presented 1-hour STEM lessons at every public school in their county, did STEM activities with homeschool students at the local library, and distributed STEM kits to preschool children.

During STEM week, 4<sup>th</sup>-6<sup>th</sup> graders made paper circuit cards and learned about alternative energy sources with the 4-H curriculum "Power Protectors." Fernwaters Charter School students worked on robotics at the Salmon Public Library. Parents also stopped by the library to pick up pinwheel kits for their preschool-aged children. K-3<sup>rd</sup> grade students made copper tape flashlights with folks from Idaho Power and the Idaho STEM Ecosystem. Middle and high school students learned about circuits using Makey Makeys with Steve Dahl of Computer Zen, a local technology company. They also learned about technology used in the medical field by using a Transcutaneous Electrical Nerve Stimulation (TENS) unit. Students controlled the movement of Steve's arm by entering code into a TENS unit hooked up to his body!

Taylor said that many of the students she worked with were excited to go home and share their STEM learning with their parents. Teachers appreciated the lessons and the supplies the TMC Lab provided. Best of all, Taylor has seen an increase in community interest in STEM learning since they put on STEM Week. She's already scheduling more STEM events with local schools for next year!

*~Amy Post, TMC Labs Project Coordinator, Idaho Out-of-School Network*

# Give It A Try: Solar System Walk

Our solar system is surprisingly vast and empty and making a solar system walk is an amazing way to illustrate this. A solar system walk does something book illustrations can't: show both planet size and distance at the same scale.

[This website](#) permits you to design a solar system walk by either selecting a scale for your model solar system, the size of a planet or the sun, or the distance between the sun and a planet. Using a 2.7" tennis ball for the sun, the calculator creates a model spanning 949.5 feet, or just over three football fields. And where is Earth in this model? It's just 24 feet away from the sun and 1/40 of an inch in diameter (the diameter of a pin head)! Create your model and have kids find items to represent each planet. But be prepared for a walk!

*~Dr. Paul Verhage, AmeriCorps Member, Idaho Out-of-School Network*



Photo of Perseus, taken with binoculars.  
By Stephen Rahn, [Public Domain](#)

## Put it Into Practice: NASA Resources

NASA's education resources are endless, just like space! The [Universe of Learning](#), the [Jet Propulsion Laboratory](#), and the [learning resources page](#) provide hundreds of lessons, including hands-on and technology-based activities.

While kids today can't make their own spacecraft (yet), they can make models of them after reading about spacecraft design online. The [Spaceplace](#) contains a spacecraft-making activity that's perfect for an out-of-school program.

The activity first introduces some of the components of spacecraft, such as communications and power. Then it suggests materials to use for spacecraft components, including some that are edible. With that background and materials, kids can design a model spacecraft that's realistic for its mission. Do not forget to have the kids give their spacecraft a name and a colorful mission patch.

I encourage anyone doing this activity to have their kids give a presentation on their spacecraft. Explain its mission (including destination), its construction and operation, and the data it will collect. Then your space gourmets can enjoy the product of their labor. Bon Appetit!

*~Dr. Paul Verhage, AmeriCorps Member, Idaho Out-of-School Network*

## Tips and Tricks:

### Astronomy with Binoculars

Humble binoculars, inexpensive and easy to use, make a great astronomical tool. This is true because many astronomical objects need to appear brighter, not larger, for better viewing. For the best views, prop your binoculars on a sturdy, unmovable surface, like a car, fence, or the side of your house.

Here are my favorite astronomical objects to look at with binoculars and a great [website](#) to help.

1. The moon and its craters.
2. Jupiter and its four largest satellites.
3. Orion nebula.
4. The Seven Sisters or Pleiades.
5. The Andromeda Galaxy.
6. The Milky Way.

It can be difficult to explain to kids exactly where to aim their binoculars. So, try pointing at the object with a green laser pointer. Now kids can follow the laser beam to the target. Just make sure not to aim the laser pointer at people, homes, or aircraft!

*~Dr. Paul Verhage, AmeriCorps Member, ION*

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# The Makerspace Playbook

Issue #29: Summer 2024

## TMC ON THE MOVE: SUMMER POP-UP TMC LAB

Set up TMC in any safe, comfortable outdoor space using these items from the TMC Lab!

**Canopy:** Provides shade on hot days, cover from light rain, and a physical space to gather. Attach a tarp to one wall for extra shade. Fill the water weights and attach them to the legs to prevent wind from catching it.

**Wagon:** Fill it up with the supplies you need for an activity or the entire day. Have kids put their water bottles and lunch boxes in it. Look for wheelchair-accessible routes to avoid stairs.

**Foldable table:** Set up stations, activities or demonstrations at the table. Have kids stand at the table, or leave the legs up, lay it flat on the ground and have kids sit around it.

**Lap boards:** Use as mobile desks, drying racks, station centers, or to carry materials.

**Pop-up trash can:** Attach a plastic trash bag using clips, zip close to transport. When it's clean, use it to store or transport lightweight items like balloons or balls.

*~ Amy Post, TMC Labs Coordinator, Idaho Out-of-School Network*



## Spotlight on You: Pittsburgh Yards Lunch & Learn

On June 7th, 2024, the Georgia Statewide Afterschool Network (GSAN) and VOICES for Georgia's Children hosted an exciting Lunch and Learn event at Pittsburgh Yards. This gathering marked a significant milestone as it celebrated and supported the introduction of the first Think Make Create (TMC) Labs in Georgia.

The event brought together dedicated staff and community members to build a strong network and foster a collaborative spirit. Participants engaged in a variety of activities designed to enhance their understanding and execution of the TMC Labs initiative. These activities included collaborative learning sessions, Quality Assurance checks for the TMC Labs, and the creation of gift bags for school districts that have been awarded these innovative labs.

The TMC Labs are a transformative addition to Georgia's educational landscape, offering youth the opportunity to engage in science, technology, engineering, and math (STEM) in a fun, hands-on environment. Each TMC Lab is independently operated and tailored to serve different youth programs, ranging from pre-K to 12th grade. This flexibility ensures that each lab can meet the unique needs of its community, providing quality out-of-school time programs that inspire creativity and critical thinking.

Special recognition was given to Pittsburgh Yards for being an exceptional host site, creating a welcoming and conducive environment for this pivotal event. The support and hospitality of Pittsburgh Yards played a crucial role in the success of the Lunch and Learn, ensuring that all attendees could focus on learning and community building. Take a moment to enjoy highlights of this great event: [TMC Build Day - Google Photos](#)

As the first TMC Labs in Georgia, these mobile makerspaces are set to make a significant impact on youth education, empowering children to tinker, make, and create. With the combined efforts of GSAN, VOICES, and the enthusiastic support of the community, the future of STEM education in Georgia looks bright and promising.

*~ Anthony Wilkes, Voices/Georgia Statewide Afterschool Network  
AmeriCorps VISTA Staff*

# Give It A Try: Balloon Tennis

Who doesn't love sports and movement during your summer program? In 30 minutes, students can use materials from their TMC Lab to make a tennis racket. This activity combines STEM and sports to make a fun summer outdoor or indoor activity.

To find this activity- go to

<https://beyondschoolbells.org/curriculum/edgerton-explorit-center.html>. Under free afterschool resources, click on GAMES.

~ Alana Pearson, TMC Labs Coordinator, Beyond School Bells - Nebraska



## Put it Into Practice: Edgerton Explorit Center

Edgerton Explorit Center in Aurora, Nebraska has put together some fun and engaging summer camp and afterschool activities. Many of these activities can be led with your TMC Labs. Most of these lessons are under two pages, which makes these great for new or younger staff members to lead. Does your community have disc golf? If so, find a 5-day disc golf summer camp lesson for 3rd-8<sup>th</sup> graders. This is just one of many FREE summer camps available.

<https://beyondschoolbells.org/curriculum/edgerton-explorit-center.html>

~ Alana Pearson, TMC Labs Coordinator, Beyond School Bells - Nebraska

## Tips and Tricks: Getting Quick Feedback from Students

It's important to get feedback from your students as you teach. So, here's a quick technique you can use to assess student understanding.

At some point in the lesson, ask your kids to give a thumbs up or thumbs down regarding how well they think they're learning the material. It's quick and everyone does it together. If kids feel they understand some, but not all the material, they can give you a sideways thumb.

With a quick scan of the classroom, you can get instant feedback regarding how your kids think they're doing.

~ Dr. Paul Verhage, AmeriCorps Instructor, Idaho Out-of-School Network

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# The Makerspace Playbook

Issue #30 Fall/Winter 2024

## TMC ON THE MOVE: NATIONAL SPOTLIGHT

TMC Labs were highlighted at the National Association of Extension 4-H Youth Development Professionals (NAE4-HYDP) conference held in Boise, Idaho in October of 2024.

1,200 attendees from all over the nation were able to visit the exhibit booth hosted by Idaho Out-of-School Network (ION) staff Anna, Amy, and Henry as well as Nebraska's Beyond School Bells staff member Alana.

At the booth, visitors were able to learn more about the Think Make Create Labs program, resources available to educators, and different professional development opportunities. They even got a chance to build binary bracelets, providing a hands-on look at what TMC curriculum offers. Booth visitors were thrilled to learn more about resources available to them to help them teach STEM education, specifically, ION's TMC Activity Guide. Their responses overall were very excited as many of them "teach STEM, but don't know anything about it."

~ Claire Sponseller, Area Extension Educator, University of Idaho Extension 4-H



## Spotlight On: Scottsbluff County, NE

A new TMC Lab—a collaboration between Nebraska Children and Families Foundation (NCFF) and University of Nebraska-Lincoln Extension—will make a meaningful impact by bringing STEM opportunities to Scottsbluff County's youth, in a very rural part of Nebraska. With its mobility and focus on hands-on learning, the lab can engage students in rural areas with activities they might not otherwise experience, like makerspace projects, engineering challenges, environmental science, and other STEM-based education.

Through a grant from NCFF, UNL Extension hired a full-time Extension Assistant dedicated to managing the TMC Lab and delivering these STEM activities to multiple schools. This position ensures consistency and gives students a great chance to deepen their STEM skills and curiosity. The initiative could be a powerful model for other regions aiming to address resource limitations in after-school programs. The partnership between NCFF and UNL Extension will continue to be an important piece in supporting rural afterschool school programs with high quality STEM programming.

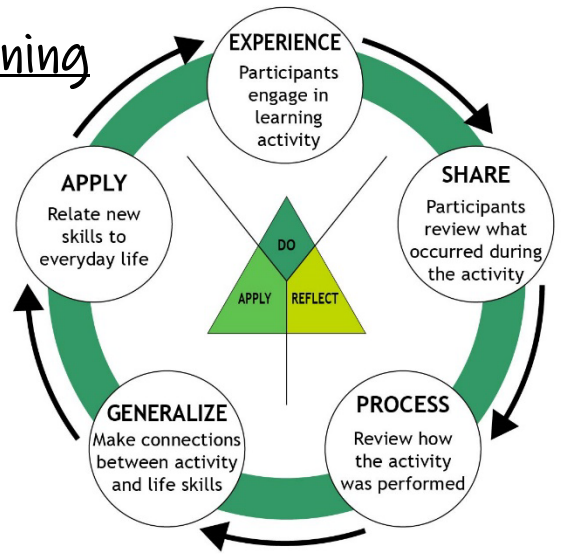
Beyond School Bells, an initiative of the Nebraska Children and Families Foundation, is dedicated to expanding high-quality afterschool and summer learning opportunities for young people across Nebraska. By partnering with schools, nonprofits, and local communities, Beyond School Bells works to create engaging, hands-on learning experiences that extend beyond the traditional school day, focusing on STEM, arts, health, and life skills. Through initiatives like the TMC Lab, Beyond School Bells is committed to ensuring that students in rural and [redacted] areas have access to enriching programs that foster creativity, curiosity, and lifelong learning.

~Alana Pearson, Community Support, Beyond School Bells

# Put it Into Practice: Experiential Learning

The experiential learning model, first published by educational theorist David Kolb in 1984, describes learning by doing. 4-H simplified the 5-step model into “do, reflect, apply.” You can use the experiential learning model to create memorable and impactful learning. It’s especially effective with hands-on activities.

During the “experience” step, youth do a STEM activity and you introduce learning content (vocabulary, concepts and/or skills). In the following steps, youth reflect on their experience and what they learned. They apply this experience and their learning by making connections to their lives and futures. This process helps cement the learning and make it relevant to youth. These steps can be followed in order, or scattered throughout the activity. ~Amy Post, ION



## Give It A Try: Catapults

Catapults are a great activity to teach with the experiential learning model. I begin the experience, or *do* section, by having the kids play with a catapult. We discuss how the catapult works, its component parts, and the concepts of potential and kinetic energy.

- I lay out materials: craft sticks, rubber bands, bottle caps and hot glue guns. I provide pom poms or pony beads for projectiles. Then, I simply tell the kids to make a catapult. It’s amazing what they come up with!

Once the catapults are done, we often have a contest to see which one shoots the projectile furthest or highest. Then we *reflect* on the experience by discussing the different designs and why we think they performed the way they did. This connects back to the discussion we had at the beginning of the activity.

Lastly, I give the kids time to redesign their catapults to make them shoot further or higher. This lets them *apply* what they learned during the activity and completes the experiential learning cycle.

~Amy Post, TMC Coordinator, Idaho Out-of-School Network

## Tips and Tricks: Planning to Use the Experiential Learning Model

Plan to incorporate the experiential learning model into your STEM activities by:

**DO:** Let kids create and problem-solve as much as possible. Don’t give step-by-step instructions.

**REFLECT:** Plan reflection questions ahead of time. After they create, ask kids how they made their projects and about their process. What worked? What didn’t? What would they change?

**APPLY:** Talk about where their projects or what they learned are found in the real world and/or in different careers.

**APPLY:** Plan time for tinkering at the end. After kids reflect on their project and how they made them, ask them to change their project to make it better or get a different outcome. ~Amy Post, ION

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# The Makerspace Playbook

Issue #31: Spring 2025

## CAREER SPOTLIGHT: ROBOTICS ENGINEER

Do the youth you work with enjoy building, problem-solving, and working with technology? Introducing them to a future career as a Robotics Engineer could spark their interest in STEM! Robotics engineers design and develop robotic systems used in industries such as healthcare, manufacturing, aerospace, and even entertainment.

These professionals typically earn a bachelor's or master's degree in robotics, mechanical engineering, electrical engineering, or computer science. Their studies include courses in coding, physics, artificial intelligence, and automation.

Robotics engineers use their skills to create machines that improve efficiency, safety, and quality of life. They may design robotic arms for surgery, self-driving vehicles, or even robots for space exploration. As technology advances, the demand for robotics engineers continues to grow, offering exciting career opportunities in cutting-edge industries.

To incorporate this into a STEM activity, consider having students design and build simple robotic models using household materials or basic coding programs like Scratch or LEGO Mindstorms. Encouraging hands-on experimentation helps reinforce engineering concepts and problem-solving skills.

By exposing youth to robotics engineering, you can inspire them to explore innovative careers in STEM!

*~Megan Studebaker, University of Idaho  
Extension AmeriCorps Member*



## Spotlight on You: INSPIRE in Taos, NM

In spring 2024, New Mexico received its first TMC Lab! Thanks to a private donation, an unused TMC Lab was recycled and retrofitted to meet the needs of [INSPIRE Bilingual Early Learning Center](#) in Taos, NM. The [New Mexico Out-of-School Time Network](#) (NMOST) coordinated with Nebraska's [Beyond School Bells](#) to move the TMC Lab to its new home in northern New Mexico. INSPIRE runs afterschool programs for 4- to 11-year-olds at three locations in Taos. These programs focus on exploration, creativity, and collaborative learning and take the children's interests and feedback into consideration to ensure continued engagement. The addition of the TMC Lab enhances INSPIRE's ability to offer STEM activities to their students and gave them the ability to incorporate STEM learning activities into community pop-up events.

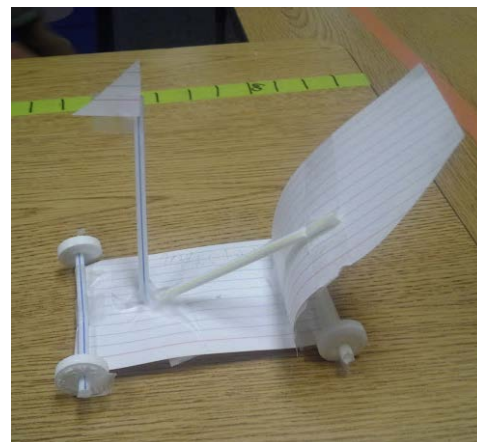
INSPIRE was founded in 2012 to meet the critical need for high-quality early childhood education that adapts to the linguistic and cultural needs of the area. Today, INSPIRE has four main locations: two in Taos, one in Arroyo Seco, and one in Red River, along with IMAGINE, a children's museum in Taos. The TMC Lab is a natural addition to INSPIRE's Reggio-inspired programs which focus on open-ended and natural materials to encourage children's exploration and self-expression. The mobile TMC Lab enables INSPIRE to engage children in the out-of-school time programs at all of their locations in hands-on STEM activities.

As New Mexico's first TMC Lab host, INSPIRE is setting the standard for the state and showing the possibilities and promise of early STEM learning opportunities for children in rural New Mexico. NMOST hopes INSPIRE's success will inspire other providers to host their own TMC Labs throughout rural New Mexico in the near future.

*~Sarah Pratt, Director of Operations, New Mexico Out-of-School Time Network*

# Give It A Try: Puff Mobile

Finding quality STEM lessons that engage students in the design process while encouraging teamwork, physical activity, and affordability can be a challenge. This TMC lesson combines all these elements by exploring renewable energy sources. Participants will design and build a wind-powered car using simple materials like straws, Lifesaver candies, paper, and tape. The goal? To get their car across the finish line using as few puffs of air as possible, an exciting way to spark creativity and problem-solving skills! To find this lesson and learn more about FREE Discover Engineering curriculum, visit this [LINK](#). These lessons also separated by time, careers, grade level, and topic. Clicking on "Challenge Video" connects you to a video that features Million Girls Moonshot flight crew members demonstrating how to complete the activity.



~Alana Pearson, TMC Labs coordinator, Nebraska's Beyond School Bells

## Advancing STEM Through TMC Labs & Local Collaboration in Rural Georgia

Twiggs County Public School's work with several local STEM partners is making significant strides in STEM education for its students. Think Make Create (TMC) Labs foster hands-on learning and innovation. At [Georgia Youth Science & Technology Centers](#) at Mercer University, students engage in interactive science and technology experiences. [STARBASE Robins](#) enhances STEM exposure with aerospace and engineering programs in the school, while [Georgia Tech CEISMIC's](#) partnership with Twiggs County Middle/High School equips students with cutting-edge computational skills.

Additionally, Twiggs County students participate in the [Museum of Aviation's](#) STEM Camps and the STEM Academy, gaining real-world insights into aviation and technology. The [Georgia Statewide Afterschool Network](#) (GSAN) has played a crucial role in supporting TMC Labs, recognizing the initiative as the first step in Georgia's STEM Ecosystem. These partnerships empower students with 21st-century skills, preparing them for future careers in STEM fields. Twiggs County continues to lead the way in rural STEM education, fostering curiosity and innovation for the next generation.

~Anthony Wilkes & Gregory Doss, Georgia Statewide Afterschool Network

## How to Build Strong Local Collaboration for TMC Labs

Successful Think Make Create (TMC) Labs thrive on strong local partnerships. In rural Georgia, engaging STEM partners, schools, and community leaders is key to finding funding, volunteers, participants, materials and other essential program resources. Start by identifying local libraries, universities, and businesses willing to support hands-on learning. Host community showcase events to highlight student projects and attract new partners. Leverage existing school programs to integrate STEM initiatives seamlessly. Encourage local businesses to sponsor materials or mentorship opportunities. Most importantly, foster ongoing communication with partners; regular meetings and shared goals ensure long-term impact. Collaboration fuels creativity, empowers students with real-world STEM skills for future success.

~Anthony Wilkes & Gregory Doss, Georgia Statewide Afterschool Network

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# The Makerspace Playbook

Issue #32: Summer 2025

## CAREER SPOTLIGHT: EQUIPMENT TECHNICIAN

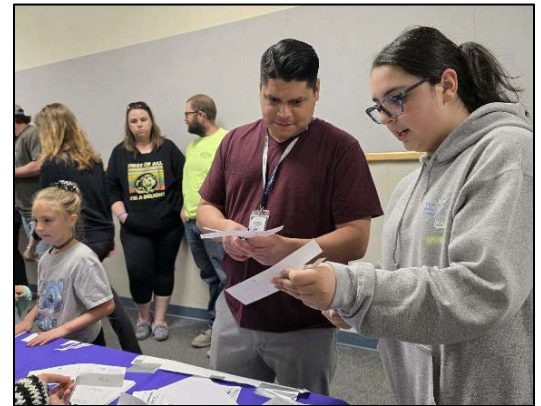
If you teach students who enjoy problem-solving, building, or tinkering with electronics, they may have a bright future as an Advanced Packaging Technology Development (APTD) Equipment Technician. This job at Micron Technology in Boise, Idaho, supports semiconductor manufacturing by maintaining and improving high-tech packaging equipment.

These technicians play a key role in ensuring machines run smoothly. They perform preventative maintenance, troubleshoot and repair mechanical issues, and work closely with engineers to enhance tool performance. Technicians often wear cleanroom suits and use diagnostic tools, software, and hands-on skills to ensure precision and quality. An associate degree in electronics, mechatronics, or relevant military experience can get them started.

You can help prepare future technicians by encouraging STEM learning in electronics, robotics, and algebra. Games like Tetris, Circuit Maze, and tools like Snap Circuits, micro:bit, or Arduino help students explore circuits and systems thinking in fun, [redacted] ways. If your students love to build, fix, and improve systems, this could be the career path that turns their passion into purpose.

*~Sarah Jones, Idaho STEM AC Extern at ION*

## Spotlight on TMC Works at Union School



Students at Union School in the Nampa School District take charge of their education through TMC Works, a career development program led by the Idaho Out-of-School Network. In the program, teens learn to facilitate STEM activities for younger kids, gaining STEM knowledge and foundational workplace skills.

The 8th and 10th grade participants underwent extensive training in planning, preparing, and leading STEM activities using a Think Make Create (TMC) Lab. To further enrich the participants' experience, Dr. Pickelstein, a seasoned STEM educator from Boise State University, visited the students. He shared his insights on teaching STEM, the importance of embracing failure as a learning opportunity, and making the material [redacted] for all youth in attendance. To provide practical experience, the participants took field trips to places like the zoo, a children's hospital, and the local science museum where they were able to facilitate STEM-related activities with an authentic audience. These experiences not only enriched their learning but also allowed them to apply their skills in real-world settings.

One of the most exciting aspects of the program is the construction of a state-of-the-art STEM lab at Union School. This lab—built, coordinated and staffed by the students themselves—will serve as a hub for STEM education for the entire school district, offering a space for teachers to bring their classes for field trips. The lab is equipped with advanced tools, including VR, drones, and woodworking equipment, all selected and planned by the students. TMC Works at Union School is a testament to the power of student-led initiatives. By giving students the tools and opportunities to lead, the program not only enhances their educational experience, but also prepares them for future success.

*~Henry Stoddard and Amy Post, Idaho Out-of-School Network*

# Give It A Try: Balloon Bust

Here's a summer STEM challenge to spark curiosity and get students moving, thinking, and collaborating—Balloon Bust. It's an exciting, interactive activity that blends creativity, engineering, and a splash of fun. The premise is simple: What happens when you drop a water balloon from a height of 25 feet? Is there a way to keep it from bursting?

In this challenge, students are tasked with designing a device or structure—using everyday materials—that can protect a water balloon when dropped from a second-story window, balcony, or even the tallest playground equipment. Through this process, they'll explore key concepts like gravity, impact force, and energy absorption, all while working together to solve messy, real-world problems. Plus, who doesn't love water balloons? This free activity can be found here:

<https://discover.org/engineering-activities/balloon-bust-2/>

~Alana Pearson, Nebraska Beyond School Bells



## Put it Into Practice: Student-Centered Learning

Student-centered instruction is focused on guiding and empowering students to take steps to take ownership of their own learning, ask themselves questions, and promote problem-solving skills, as opposed to teacher-centered instruction, where the facilitator models or explicitly shows answers.

Using a student-centered approach helps students develop skills of independence and creativity while providing deep engagement. An example that you may have seen is a collaborative invention challenge. With this strategy, students work in teams to design and build solutions to a posed problem or question, like creating or building a model that can launch a ball across the room. A second example could be posing a real-world problem and inviting students to collaborate to create a solution. With this format, students start with a problem that matters, then they work together to create their own solutions using collaboration and design thinking. Examples of this could include reducing lunchroom waste, local accessibility issues, or local environmental issues.

~Caitlin McLeod, Idaho STEM AC Extern at Idaho Out-of-School Network

### Tips and Tricks: Effective Questioning to Deepen Student-Centered Learning

Using effective questioning is a key component to success with student-centered learning. Preparing open-ended questions before the lesson helps students think critically and reflect deeply. Questions like “Why do you think that happened?” or “Can you think of a different strategy to try?” will encourage exploration without providing students with an answer. You can also ask students to explain their reasoning, compare ideas, or predict outcomes of changes. For even deeper learning, have students generate their own questions during activities. This strategy increases ownership, adds meaning, and promotes genuine curiosity.

~Caitlin McLeod, ION

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