



LABS

# The Makerspace Playbook

Issue #17: February 2023

## SPONSOR SPOTLIGHT

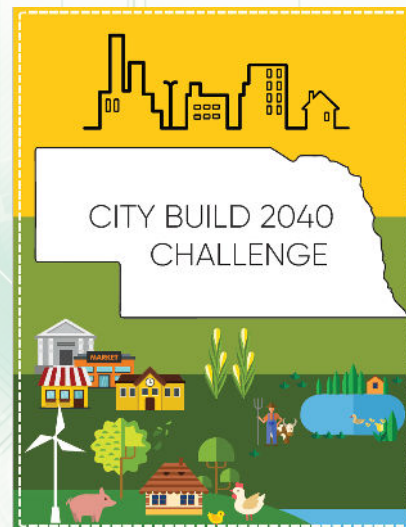
It is remarkable that in just two years, 25 Think Make Create mobile labs have provided hands-on STEM education to over 20,000 rural and underserved communities in Idaho. Even more remarkable is that Optum Health – an international company that has served over 100 million patients worldwide – saw the potential for this program as a behavioral health intervention and stepped up to make it happen.

Optum joined the TMC team in 2021 as an inaugural “lead sponsor” through the Idaho STEM Action Center’s private public partnership program. Optum was interested in the intersection between inquiry-based education and positive youth outcomes that could be explored by Medicaid service providers. Over two years, Optum provided \$120,000 to the program, and when matched by the STEM Action Center this allowed the Idaho Out-of-School Network to build and support six TMC Labs with training and technical support.

TMC Labs with the Optum logo have been seen by approximately 15,000 people across rural Idaho associated with more than 360 educational sessions and public events. Optum Idaho TMC labs have been used directly by 4,857 youth from across the state and continue to be used nearly every week of the year.

Thank you to Optum.

~ Wendy Wilson, Idaho Afterschool Network



## Spotlight on TMC Challenge Month

Science, technology, engineering, math, oh my! STEM is a fundamental part of our Think, Make, Create Labs. As we have seen tremendous growth over the last several years we want to bring a sense of community to our fleet. New for March 2023, we are introducing TMC Challenge Month. This year we are going to focus on the E in STEM, engineering. Our challenge this year we will be using the 2040 CityBuild program from Beyond School Bells. CityBuild is a hands-on, minds-on experience for k-8 youth to use recycled and TMC Lab materials to build a representation of their town as they envision it will look in 2040, a time when they may be the next generation of community leaders. There are three different options this year – 2 day build, 4 hour build, and 2 hour build. To learn more and check out each option visit our TMC Lab Community website: <https://go.unl.edu/tmcchallenge>

~ Julie Boyle, Nebraska Extension

# Give It A Try

Humpty Dumpty sat on a wall... We all know how this ends, Humpty can't be put back together again! What if we could engineering something that would prevent Humpty Dumpty from breaking after falling off the wall? In this activity, students use the engineering design process to design and build a package that will keep an egg from breaking. Check it out on the Click2Engineering website: <https://click2engineering.org/learning-activities/activity/egg-drop-activity/>

~Julie Boyle, Nebraska Extension



EGG DROP EXPERIMENT can you keep an egg from breaking?



## Put it Into Practice

Tinkering is a great way to help youth learn how to persist and learn from failure – one of the 10 practices for developing an engineering mindset on Click2Engineering. Time to explore and tinker can provide youth with positive experiences with failing and help develop an engineering mindset. Encourage your tinkerers to take time, to explore and be creative, and most of all, to persevere through challenges to create something they are proud of. To learning more about persisting and learning from failure and developing an engineering mindset visit: [click2engineering.org](http://click2engineering.org).

~Saundra Frerichs, Nebraska Extension, Click2Engineering, Click2SciencePD



## Tips and Tricks

Tinkering is a lot like play. In my kindergarten, there was an art area with paints, glue and paper. The block area had cars and big wooden blocks. The house area had new costumes and props each month. The Exploratorium's [Tinkering Studio](#) has ideas and projects for creating space to play, tinker, and be creative with supplies from your TMC.

Begin with instructions to create something quickly and simply – to help youth get familiar and interested in the materials. Then give them time and resources to modify the project with their own creative ideas. Just like in my kindergarten, you can rotate the supplies for your tinkering studio every week or two, so students get to explore different projects like [Building with Slots](#) or creating with [Paper Circuits](#).

~Saundra Frerichs, Nebraska Extension, Click2Engineering, Click2SciencePD

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# The Makerspace Playbook

Issue #18: March 2023

## TMC ON THE MOVE: SPRING INVENTORY

The mobile TMC Lab is a wonderful way to bring high quality STEM learning to rural afterschool programs. The mobility and wide variety of supplies it carries are essential to its success, but how do we manage inventory in such mobile world? One way to do this is by having a system in place to know what is being used, what is low, and what needs to be replaced.

The totes in each TMC Lab should be labeled by the type of supplies it holds. You can provide inventory sheets and how much of each supply should be in the tote. This way those who manage buying new supplies know what is running low. Another strategy we can use is planning ahead. Using lesson plans helps us to know how much/how many supplies will be used and how quickly they need to be replaced. You can use these strategies with pen and paper or keep your inventory list digitally.

Whatever you may use, be sure to keep your inventory organized and check it frequently to be sure you have the supplies you need.

*~Julie Boyle, Nebraska Extension*



## Idaho TMC Partners with Schools for STEM Nights

School STEM nights are starting to grow in numbers, post-pandemic, and each look a bit different depending on the school district. In Idaho, 4-H and the Department of Education have partnered to make resources more available to communities by supporting family STEM nights held at the local school. Our Think Make Create Lab hosts work with school partners to bring in the TMC hands-on activities that students and families enjoy, in addition to \$500 for any expenses the school may have in hosting the event. This partnership has increased excitement for offering making and tinkering STEM activities and allowed the schools a little bit of ingenuity when planning how the funds would be used. Some schools chose to go a bit traditional by purchasing curriculum or display boards for all the students. But others purchased meals for the teachers, provided a potluck for attending families, supplies for edible aquifers, or in the unique case in Calder Elementary (see our Program Spotlight from #16/Dec 2022-Jan 2023) the funds sponsored the whole event!

As outreach partners in STEM education, we have a unique opportunity to support in-school education through our informal programming. By participating in school STEM nights, we can share our activities and expertise in hands-on STEM education and increase the opportunities our youth have to grow and discover. In the last year, we have reached 2,500 youth. With a few more months still left in the 2023 school year, we look forward to reaching that many more through the wonderful world of making and tinkering and Think Make Create Labs.

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

# Give It A Try: Kapla Blocks

Though simple in their concept, [Kapla](#) blocks are a little more challenging when you actually go to design and build. Luckily, there are some books to help inspire when tinkering with these blocks. Our favorite part is that they are attractive to youth and adults and they are versatile enough to work well in small group instruction or at a larger, community event. They are adaptable and challenging to all levels of experience and come in different kit sizes to accommodate all levels of budgets. What will you build first?

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



Idaho is inviting all states to join them for TMC Shop Talk, a one-hour networking and educational sharing opportunity for all those using Think Make Create Labs.

## SHOP TALK

TMC

Wednesday, March 15th  
12:30 pm MST | 1:30 pm CST  
<https://uidaho.zoom.us/j/86857743379>

## Put it Into Practice: Content Standards

Content standards are the knowledge and skills that students should have gained by the end of each grade. However, very seldom do out-of-school providers use them.

My question is: "Why not?"

Both in-school and out-of-school education have the same target audience. Our goal as out-of-school educators is to help our youth grow and thrive. Why not use content standards to set our youth up for success by using the same language and terminology that they may take back to the classroom? Using standards does not have to be difficult. Incorporate only one or two standards per lesson; build them into your learning goals and use them to help introduce new terms and definitions. By focusing on phenomena, skills, and cross-cutting concepts, turn your activities that were only hands-on, into minds-on as well!

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

## You're Invited!

Join Idaho's **TMC Shop Talk**, a networking opportunity for educators using Think Make Create Labs, a mobile makerspace program.

The meeting lasts no more than an hour and typically follows the same agenda: introductions, program highlight, resource share, leadership update, and Q&A.

Idaho participants would welcome the opportunity to talk and meet with educators in other states. This is a great chance to network and learn how we can keep our programs exciting.

**Join us by zoom on Wednesday, March 15 at 12:30pm MST / 1:30pm CST.**

<https://uidaho.zoom.us/j/86857743379>

Questions or need technical help, email Claire at [csponseller@uidaho.edu](mailto:csponseller@uidaho.edu).

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# The Makerspace Playbook

Issue #19: April 2023

## CAREER SPOTLIGHT: GIS PLANNER

During the City Build program, youth fill the role of many professionals involved in city planning. One of these roles is a GIS Planner.

GIS, or Geographic Information Systems, are tools utilized to store and visualize geographical data. This data can be anything that is associated with a location. For example roads, buildings, and even people.

Professionals utilize GIS to visualize information and make informed decisions. This could be used to monitor public health, plan for urban growth, or any number of other things. When it comes to urban development, GIS information is utilized to make informed decisions about where things like schools and grocery stores should be placed.

During the city build program, youth utilize their knowledge about their community to create a plan for what their community could look like in 2040.

*~Christine Wood, SDSU Extension 4-H  
STEM Field Specialist*



## Spotlight on You:

### South Dakota Afterschool Network City Build



The Kids Inc afterschool program in Sioux Falls participated in the first edition of City Build 2040 in the state of South Dakota this past month. The project asks students to consider the ways in which they'd like to see their city improve over the next few decades and what they envision for the future. The students at Terry Redlin Elementary school had some impressive ideas and infectious energy as they led volunteers from the City of Sioux Falls and the South Dakota Afterschool Network through the city planning process. Students showed their concern for issues related to climate, health care, and the arts through their designs for skate parks, hospitals, daycares, and even a "clean air exchanger" to remove pollution from the air. The whole project started with a brainstorming session working in small groups paired with an adult volunteer. Each group was asked to think about things that all cities need to ensure that their citizens have their basic needs met. From there students could think about additional building projects that would improve the quality of life for their citizens and set their city apart from the others. Interestingly, students were quick to recognize the importance of childcare and having safe, fun spaces for them to enjoy both during the school day and after. By involving volunteers who work for the City of Sioux Falls, many of whom are involved with city planning themselves, the project had even greater meaning for the students. This community partnership in the afterschool space is a great example of the power of Out-of-School time activities and their impact on youth. We are so thankful for all of those involved in the project and are confident that the next generation of builders and innovators will build cities we can all be proud of.

*~Jeff Sebern,  
SD Afterschool Network Director of Programs*

# Give It A Try

**Makedo** is a reusable toolkit designed for kids to construct cardboard creations using just a few plastic tools and recycled cardboard materials. They are a great option for programs with large groups of innovative students. The Makedo kits come in three different sizes, each with plastic tools such as a safe-saw, screwdriver, fold-roller, and screw, all in a box that doubles as a toolkit. Make sure to share how to properly hold the Makedo tools as there are sharp enough edges to cause first-aid responses! The best part is that you can deconstruct the cardboard and reuse the tools to create a new design each time. With a Makedo kit and creative minds, the possibilities are endless!

*~Lillie Carnell, 4-H Program Coordinator,  
University of Idaho Extension 4-H*



## Put it Into Practice

For our event using Makedo, we divided the group of students into teams of 4-5, gave them a crash course on proper Makedo tool safety, and gave them three simple directions. 1) You must work as a team to develop a blueprint of what structure you would like to build. 2) Each group will be provided with the same tools, the same number of screws, a roll of masking tape, and three large pieces of cardboard. 3) In 30 minutes, they must work as a team to construct something that moves using their resources.

One group built a roller coaster cart, one team built a robot that doubled as a vehicle, and another group built a racecar. One student who was working with his team to build a racecar wanted to add a steering wheel, so his team began to brainstorm. His innovative idea to add a single screw to the middle of a rectangular piece of cardboard was brought to life as the whole team worked together to create a cardboard steering wheel that turned 180 degrees.

*~Lillie Carnell, 4-H Program Coordinator,  
University of Idaho Extension 4-H*

## Tips and Tricks

How can you make a Makedo activity run smoothly?

- Walk your students through the toolkit before the lesson
- Have students make observations about each tool
- Demonstrate how to use each tool properly and safely
- Provide simple directions (Ex. build a structure that has four sides, create an object that moves)
- Have students create a blueprint of their design before handing out materials
- Give each student/group an opportunity to show off their design
- Ask questions about challenges they faced when building and how they overcame them

*~Lillie Carnell, 4-H Program Coordinator,  
University of Idaho Extension 4-H*

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# The Makerspace Playbook

Issue #20: May 2023

## TMC ON THE MOVE: SUMMER ORGANIZATION TIPS

Before summer starts, inventory and organize your lab. This is a great way to get comfortable with your lab and will make finding supplies easy. Create a form or dedicate a notebook where you write down the materials you used.

It's very easy to forget which materials you used if you don't write it down right away, so make sure you do it at the end of each day or activity. Program leads can then use the forms/notebook to order and restock supplies.

Create a labeled "reshelve" box for your lab that serves the same function as a reshelve cart at the library. If you're too busy to put supplies back in their assigned location, or if you don't know where they go, put the supplies in the reshelve box. You can put these things back in their correct location (or figure out where they go) when you have more time. This will avoid clutter, mixed-up storage bins and replacing items that were simply misplaced.

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



## Spotlight on You: TMC On the Go!

Have you heard about the Think Make Create On the Go! Kits? We like to call it, "A classroom in a box!" These educational kits developed by the University of Idaho 4-H Extension are designed to include everything you need to facilitate quality STEM learning for a group of youth in any location. Lesson plans, materials for 30 students, handouts, STEM literature related to careers, and youth evaluations. The TMC On the Go! Kits are specifically designed for out-of-school time learning in Idaho for grades 3-5 with an emphasis on STEM lessons and activities that are not already in the Think Make Create Live Binder or trailer materials. We have gotten such amazing feedback from those who have used the TMC On the Go! Kits for spring programming.

Our folks at the Benewah County Extension 4-H Office have already gotten their hands on the Seeds to Bees TMC On the Go! kit. There are four hands-on lessons in this kit for students to learn all about plants and pollinators through experiential learning and literature. Students create seed balls as they learn about the plant life cycle, make desktop greenhouses and carry out an investigation as they explore photosynthesis, learn the parts of the flower and explore the principles of pollination, and create mason bee nesting habitats. Here is what Polly Grasham, a 4-H Youth Development Instructor, had to say:

*"Thank you! We held the Seeds to Bees camp yesterday and had the best day! There wasn't a single project we didn't love. We'll get those surveys back to you in the next few days and are anxiously awaiting the Forensics TMC On the Go! Sending you a photo from the Flower Power activity."*

We appreciate the feedback and the work you have all done and continue to do for the youth in your communities!

~Lillie Carnell, 4-H Program Coordinator, University of Idaho Extension 4-H

# Give It A Try: Wildfire Education

Adult supervision is required for this one, because you'll be playing with fire! Danielle Marquette of Boise State University developed a wildfire curriculum for her Master's thesis that has been a big hit among 4<sup>th</sup> graders in Idaho. The unit teaches about wildfire in Idaho's forests, grasslands and communities, and how climate change influences the way these fires burn. The lessons contain hands-on, inquiry-based demonstrations that could be used at any grade level in any location, with minimal supplies.

To demonstrate the fire triangle, all you need are a match, a jar, and a little bit of Playdough. You can compare fuels and learn how moisture influences their flammability. The matchstick forest demonstration allows you to vary the density of "trees" and slope of the ground to observe how fire spreads under different conditions. The erosion demonstration illustrates how organic matter helps filter rainwater, using just a couple bottles, some water, dirt, and leaves.



This curriculum is available online for free at <https://sites.google.com/boisestate.edu/wildfire-unit/home>. Contact Danielle at [danielleayarra@u.boisestate.edu](mailto:danielleayarra@u.boisestate.edu) for more information.

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

## Put it Into Practice: 'Grab and Go' Kits

As the end of the school year approaches and we head into summer programming, we want to think about what will make your job as facilitators easiest. What do our educators need to continue to provide quality learning outside of the classroom? After traveling around the state of Idaho to meet all the wonderful informal and formal educators we have in our communities to share our resources, like the TMC On the Go! Kits, there was a consistent message I received from each group: educational kits or "grab and go" activities are in high demand! The response of the TMC On the Go! Kits from our educators has been: "These kits are awesome!", "This is going to be huge for our rural program" and, "We need more of these 'grab and go' kits". We hear you! These pre-planned lessons and materials in a box provide the convenience and efficiency that all educators need to prepare for the busy spring and summer months. They make learning fast, easy, and more effective. Not only is there an increase in the options for purchasing learning kits, there are also ways to create your own kits or have a checkout system with lesson totes. A great option to create your own 'grab and go' kits is to gather materials, handouts, and books into a tote to bring the lessons anywhere the youth are!

For more resources on STEM educational kits, visit [stemfinitly.com](http://stemfinitly.com), [shop4-h.org](http://shop4-h.org), or even customize a kit on Amazon. To learn more about the TMC On the Go! Kits, reach out to [ljcarnell@uidaho.edu](mailto:ljcarnell@uidaho.edu).

~Lillie Carnell, 4-H Program Coordinator, University of Idaho Extension 4-H

## Tips and Tricks – Summer Sun Safety

The benefits of a mobile maker lab is being able to set up a making experience pretty much anywhere, even outdoors. When creating an outdoor experience consider:

- Sunburns - apply sunscreen 15-30 minutes before going outside.
- Heat Exhaustion -
  - When possible avoid sun exposure between 10 a.m. and 2 p.m. when UV rays are the strongest.
  - Set up your maker space in shade when possible.
- Dehydration - have plenty of water on hand.
- Shoes - encourage youth to wear closed toe shoes/shoes with backs.

~ Christine Wood, SDSU Extension SD 4-H STEM Field Specialist

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# The Makerspace Playbook

Issue 21: June 2023

## SPONSOR:

IDAHO STEM ACTION CENTER

Having wonderfully supportive partners is fundamental to any successful program and within Idaho, our Think Make Create Labs has the Idaho STEM Action Center. Created in 2015 by the Idaho Legislature, they work to recognize disparities in Idaho: access and awareness gaps for students, inconsistencies in training and support resources for educators, and economic inequalities within Idaho's communities – and providing opportunities for Idahoans to realize their full potential by overcoming these barriers.

As a major supporter of TMC in Idaho, they have worked tirelessly to promote our program with educators across the state, recruit industry partners for TMC financial support, as well as provide their own matching dollars to the TMC program.

The Idaho STEM Action Center works tirelessly to expand access and resources to STEM education throughout Idaho and has become a stable educational partner for many underserved communities.

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



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## Spotlight on: Ensuring Quality STEM Learning – an Online Course

Have new seasonal or full-time staff and need some professional development to help on-board them sooner rather than later? The South Dakota and Idaho Think Make Create Lab programs have created an on-line course to help offer professional development opportunities for more frequent training access.

Visit Extension Foundation at <https://campus.extension.org/>, where they have created a course called Ensuring Quality STEM Learning. This course is aimed at helping out-of-school professionals create a quality STEM learning environment. Through the course, educators will become more familiar and comfortable with the best practices of STEM programming with a focus on Positive Youth Development. There is both a long and short version of the course to accommodate different needs and can be completed at the learner's individual pace. The five modules cover:

1. Safe Trailer Practices (safety protocol and measures)
2. Successful STEM Programming (selecting activities, putting it into practice, getting ready to make)
3. Developing STEM Practices and Mindset (active STEM learning, modeling STEM practices, asking questions)
4. Positive Youth Development (what is positive youth development, panel discussion)
5. Wrap-up (summary of course)

The course is free and can be accessed by creating a free profile when visiting the Extension Foundation. Once the course has been completed, we encourage an in-person hands-on training to support the course work by contacting your state's TMC program: **South Dakota** or **Idaho**.

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

# Give It a Try: Water Striders

Summer is a great time to play with water and learn about the creatures that live in it. Learn about the unique properties of water by studying a critter that can literally walk on water: the water strider!

Water molecules have a positive end and a negative end that are attracted to each other. These two ends stick together much like two magnets. When water molecules stick together, they create surface tension. Surface tension is a force that makes water behave as if it has a very thin skin. Water striders have water repellent hairs and spread their weight out over a wide area, which allows them to walk on top of this "skin."

Follow this lesson plan [HERE](#) to create your own water strider with only thin copper wire, a pair of scissors and a bowl of water. You can add some character to your wire water striders by adding a tape body and googly eyes.



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

## Put it Into Practice: Careers

"You can't be what you can't see" means kids need to know about careers and jobs in order to aspire to fill them one day. Here are two resources for STEM career exploration.

### Learning Blade

Learning Blade's Mission Challenges engage students in real-world problem solving, from dolphin rescue to car manufacturing. Each Mission Challenge includes hands-on activities and introduces the careers involved in these real-world situations. Each Mission Challenge is accompanied by Papercraft printables, which are cut-and-fold figurines, featuring STEM professionals, that kids can make and play with. This resource is available for free to Idaho educators through support from the STEM Action Center at this link: [www.learningblade.com/ID](http://www.learningblade.com/ID). Contact [joshua@learningblade.com](mailto:joshua@learningblade.com) for more information.

### Skype a Scientist

Skype a Scientist connects real-world STEM professionals directly with students for free. This network connects classrooms, groups and families with a volunteer scientist or STEM specialist on video-conferencing calls. Students can then speak directly with the professional, who can show them their work, tell them about their career and background, and answer questions. Learn more at [skypeascientist.com](http://skypeascientist.com).

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

## Tips and Tricks: Engaging Community Partners

How to connect with local industry leaders and community partners:

- Attend an open house, search their webpage for the HR/PR person, or reach out to them directly.
- Reach out to explain who you are and what your mission is by email, phone call, or even in person.
- Invite them to an event and provide as many details as possible. Explain what the event is, the target audience, and why they should be involved.
- Be patient and understanding! They are often very busy, and it may be difficult to get on their schedules right away.
- Be persistent! Keep in contact, keep them updated on your events, and try again in a few months.

~Lillie Carnell, 4-H Program Coordinator, University of Idaho Extension 4-H

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Think Make Create

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# The Makerspace Playbook

Issue #22: July 2023

## TMC ON THE MOVE: SUMMER PREPARATIONS

In preparation for another busy summer season, here are a few things to consider when planning outside activities with your mobile makerspace.

- **Issue #20**, we shared 'tips and tricks' on summer sun safety.
- **Issue #11**, we talked about what materials might be helpful to prepare for 'on the move' locations. This has some of our favorite go-to purchases for outside spaces.
- **1st aid kit**: A good one doesn't need to cost much, but is essential.
- **Easy clean-up**: lay down a tarp underneath your work area.
- **Walk through your location**: remove any pokies (goat heads) in the grass or hard/sharp surfaces and protrusions (large rocks or sprinkler heads), this will help you secure a safer location for all your littles who either won't pay attention or may find them and injure themselves.
- **Don't be afraid to take a break!** You want kids to stay engaged and have fun, and sometimes that means walking away from their work to come back with fresh, new ideas!

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



## Spotlight on You: South Dakota

This past month, our Eastern South Dakota TMC mobile lab traveled to Alcester, SD. While onsite the students and staff were able to take part in one of our exciting new activities: strawberry DNA extraction.

Any good science experiment starts with a fresh reminder of safety and the importance of using personal protective equipment (PPE). It also helps that when students put on a lab coat, goggles, and gloves they start to FEEL like a scientist and that can make all the difference.

Students started the procedure by selecting a strawberry and smashing it into tiny bits inside a plastic ziploc bag. This begins the breakdown of strawberry cell walls which ultimately allows us to extract DNA. Next, students and staff discuss the composition of cells and how beneath a cell wall is a highly flexible cell membrane. This membrane is more difficult to break apart through physical means so we must use chemical methods at this phase. Students made the connection that soapy water is effective in breaking down bacterial cell membranes and sanitizing our hands when we wash them. This same principle is true for strawberries, and this is why a solution of soapy water helps us break down the strawberry cell membrane and release the DNA contained within the cell. Students then filter the resulting solution and then carefully pour cold rubbing alcohol to force the DNA to rise out of the solution. At this phase we can use a toothpick or cotton swab to collect the DNA that comes out of solution where the alcohol and soapy strawberry layers meet.

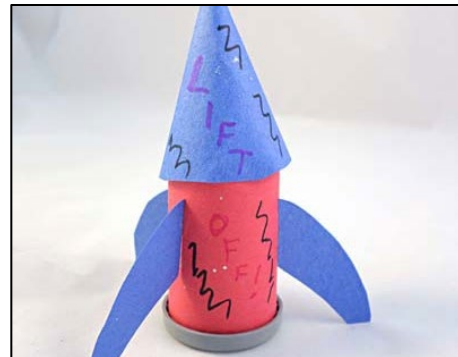
What makes this experiment so impactful is that students are able to reliably obtain a result, and the scientific explanations at each phase can be differentiated based on the age of the students. Older students can explore the cell biology at play in greater detail, while younger students can focus on measuring, motor skills, and the idea that DNA is like a recipe for our bodies to make new cells.

This experiment uses simple household materials to create a learning opportunity that can be adjusted for nearly any age group. It's also a wonderful way to help students envision themselves as scientists and give them the confidence that they can do it.

~Jeff Sebern, Director of Programs, South Dakota Afterschool Network

# Give It A Try: Baking Soda Rockets

There are a few different versions of this activity, but Science Buddies uses old film canisters which often makes for a more 'controlled' rocket. In their version of [Baking Soda Rockets](#), all of the materials are inexpensive and cost less than \$1/youth. This is a fun outdoor activity that gets kids moving and excited. Plus in this lesson, there are great questions to further explore the design and build of each rocket, providing a few more excuses...I mean reasons...to launch again and again. Easily adaptable for a wide range of ages, but precaution should be made and safety groundrules should be set before you begin.



For more seasonal activities ideas, check out the [Science Buddies STEM Calendar!](#)

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

## Put it Into Practice:

### Themes Increase Relevance

Themes are a powerful way to connect children to learning and create fun, engaging programs. When a theme is interesting, kids get excited about participating in activities and lessons. And when themes are familiar to kids, they can connect the program content with their own lives.

Themes unify activities and subject areas by tying them together. A thematic program could include fictional stories or non-fiction books, craft projects, science demonstrations or explorations, and games, all adapted to the theme. In this way, themes can also make program planning easier by focusing activities and providing a backbone.

For example, a summer camp planned around the theme of "insects" could include stories like *The Very Hungry Caterpillar*; lessons on different types of insects and their adaptations, songs about bugs, nature walks looking for insects, and games adapted to the theme (i.e. "Sharks and Minnows" could become "Spiders and Flies.")

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

## Tips and Tricks: STEM Calendar for Educators

Did you know that July is the best month to eat ice cream? July 4 is Independence Day in the U.S., and it's a great day to throw a mad tea party. This month also presents unique opportunities to comb the beach and peer at the moon!

Check out the [STEM Calendar for Educators](#) from Science Buddies to learn about celebrations, events and anniversaries throughout the year. Use this calendar to chose themes for programs and activities. Here's what's happening in July:

- National Ice Cream Month
- July 1-7: Clean Beaches Week
- July 4: Independence Day
- July 4: Alice in Wonderland Day
- July 20: Anniversary of Apollo Moon Landing

~ Amy Post, TMC Coordinator, ION

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Think Make Create

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# The Makerspace Playbook

Issue #23: August 2023

## MAKING CAREER CONNECTIONS: DETECTIVES

Detectives work to uncover evidence and search for clues. They use keen observation skills and critical thinking to solve crimes or find missing people.

Detectives can work in a variety of locations and settings. They may also work as private investigators where they assist in putting together clues to solve puzzles. Detectives work in local police stations where they visit crime scenes and interview people to aid in solving cases.

Detectives use forensic science to aid them in their work. Forensic science applies chemistry, biology, and physics to analyze clues. Forensics include fingerprints, DNA, Hair, footprints, handwriting, and so much more. Electronic data is also a type of forensics that can be utilized in solving mysteries.

~ Christine Wood - SDSU Extension  
4-H STEM Field Specialist



## Science Walks Engage Community in STEM

A truly successful program is defined by a string of events in my eyes. A student approaches the Think Make Create (TMC) Lab with trepidation, anxiety, and an overwhelming desire to distance themselves from being the center of anyone's attention. The challenge begins: engage, but don't overwhelm the student. Create enough space for the participant to engage, but not to put pressure on them to do, or even succeed. As the instructor, making a mistake in front of your students can be a powerful tool for reaching these students. Obfuscating the fact that your mistake was an intentional effort to inspire them is a learned trait.

The moment trepidation, hesitation and anxiety evolve into pure curiosity and discovery is the moment you know that this program is a true success, no matter the number on your attendance counter.

I see this occur often during our library's "Science Walk" programs. I'll park the TMC Lab at a popular trail nexus and set up a mobile science center with binoculars, microscopes, sample collection tools and more. Visitors will engage, often out of pure curiosity, and are delighted to learn that they can take some of these items with them out on the trail to enhance their experience. These are programs where parents can learn right alongside their children, to be able to experience things they don't see every day. After the program wraps for the day, we can report the findings of the day's community scientists to the organizations that host us to help identify the health of the local ecosystem.

Democratizing science helps pull STEM out of the lab and into our everyday lives, inspires curiosity, and gives us all a new perspective on the world around us.

~ Brenden Bobby, Exploration Coordinator for Experiential & STEM Learning, The Library at Sandpoint (Idaho)

# Give It A Try: Forensics

Forensic science activities combine a variety of STEM fields together into an engaging project based learning opportunity. Youth learn observation and teamwork as they develop knowledge. Activities can be done alone, or they can be paired together to solve a mystery.

Consider activities like fingerprinting (<http://www.cyberbee.com/whodunnit/fp.html>), calculating height based on footprints (<http://www.cyberbee.com/whodunnit/foot.html>); teeth impressions (<http://www.cyberbee.com/whodunnit/teeth.html>); tool impressions (this can be done similarly to teeth); or powder analysis (<http://www.cyberbee.com/whodunnit/powder.html>).



~Christine Wood, 4-H STEM Field Specialist - SDSU Extension

## Put it Into Practice: Family/Community Events

Community events offer a unique opportunity to showcase the Think, Make Create trailers to a wider audience. As the South Dakota Afterschool Network traveled across the state we learned a lot regarding best practices for these events. OST programs don't need to be reminded about the importance of flexibility, but this is especially the case when facilitating community events. Having a combination of standalone activities (Legos, K'nex, Ozobots) and a focused activity (those based on TMC curriculum) can make all the difference. This balance meets the needs of a diverse group of learners and accommodates families so they may socialize and make the connections that make community events worth the effort. In addition, encouraging near peer interaction can be a powerful way to achieve buy-in and empower older students to teach their younger peers a new skill. As more and more emphasis is placed on community and family events, finding a balance with programming and encouraging student interaction can help lead to a successful event.

~ Jeff Sebern, Director of Programs, South Dakota Afterschool Network

## Tips and Tricks: Transition to School Year Programming

As we transition from summer programming to the school year, here are a few ideas to help manage the stress and prepare well for the next school year:

- Intentionally manage your time between office tasks (hiring and recruiting staff, enrolling students, program planning, etc.) and tasks that keep you moving (rearranging classrooms or makerspaces, outdoor projects, etc.).
- Shift your thinking from finding ways to keep students engaged during long summer days to providing outlets for creativity and social interaction. Your students have been in school all day and their needs are going to shift.
- Believe in yourself, your staff, and your students. As everyone transitions to a new routine, a sense of belief will ensure your plans are successful.

~ Jeff Sebern, Director of Programs, South Dakota Afterschool Network

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# The Makerspace Playbook

Issue #24: September 2023

## SPONSOR: SOUTH DAKOTA BIOTECH ASSOCIATION

Our newest partner in the promotion of STEM learning in the out-of-school (OST) space is the South Dakota Biotech Association. As a similarly functioning state entity that functions as part of a national organization, we are thankful for the resources, expertise, and funding opportunities made available by our friends at SD Biotech.

Our current efforts in South Dakota are to establish regional STEM ecosystems that engage schools, informal educators, industry, and community leaders to provide students a well-rounded continuum of STEM learning opportunities throughout their K-12 education. SD Biotech has offered OST programs in our state \$1,000 mini grants to expand their STEM education and will partner with South Dakota Afterschool Network (SDAN) and many others on the STEM ecosystem project.

After first identifying STEM ambassadors that represent the many OST programs in our state, it is our hope that these individuals will help lead the way for informal education and its role in the broader STEM ecosystem. We are thankful to have an industry partner like SD Biotech to work with on this endeavor.

*~ Jeff Sebern, Director of Programs, South Dakota Afterschool Network*



## Spotlight on South Dakota: Mobridge Tiger Kids

The new summer and afterschool program in Mobridge, South Dakota offers the community a vital service and the students an enriching experience. This summer the Tiger Kids program was able to spend a few weeks utilizing the TMC mobile labs to offer hands-on STEM learning opportunities. Fortunately, I was able to spend some time with the program as we explored coding with [Ozobots](#) and competed in a paper rocketry design challenge. A new feature of the South Dakota TMC fleet, [Ozobots](#) have been a great starting point for younger elementary students as they learn about coding. To control their robots, students created tracks for the [Ozobots](#) to follow and explored all the different commands the robots respond to through color patterns.

The [paper rocketry design challenge](#) was an activity from Exploratorium that challenged students to first build their rocket launching apparatus, and then create a paper rocket that is both aerodynamic and properly weighted for flight. Using PVC pipes and fittings along with plastic bottles as the air-powered launching device, students tested and refined their designs using the engineering design process. We appreciate the community of Mobridge welcoming us to their school and engaging in STEM learning in such a fun and meaningful way. We hope their experience with the TMC mobile labs sparks further STEM learning in the future!

*~ Jeff Sebern, Director of Programs, South Dakota Afterschool Network*

# Give It A Try: Nature Weave

As summer comes to an end, we encourage you to get kids outside to enjoy the last bits of warm weather. Try this nature weaving activity! Send your kids outside with the task of collecting sticks, leaves, flowers, greenery, and any other items they want to add to their weaving project. All you need to provide for this activity is yarn, while the rest of the materials can be found in nature. If you do not have access to these items, create flowers using paper origami, purchase fake flowers, or use wooden dowels to mimic sticks. The first step is to create a wooden frame using string to connect four sticks of equal length. Hold two sticks perpendicular to each other and begin winding the yarn around the ends to secure the sticks together. Continue adding sticks and yarn until you create a square. Once the frame is finished, loop the string around each end of the sticks until the frame has lines of string across it completely. Now you are ready to weave in the natural items you collected into the yarn! This activity is a great way to incorporate the natural world into your teaching, have students practice their fine motor skills, and let their creativity flow.



~Lillie Carnell, 4-H Program Coordinator, University of Idaho Extension 4-H

## Put it Into Practice: Educator Stories

Do you ever wonder what your fellow TMC Labs educators are up to? The Idaho Out-of-School Network collects user reports from their labs, which are filled with wonderful stories of youth discovering, tinkering and exploring STEM. Here are some stories from Idaho.

"While using the TMC lab, children who normally struggled to engage were focused and excited! It was such a win to see those difficult youth ready and enthusiastic to learn." -Cadey from Valley Co 4-H

"The Kapla planks capture the kids' attention every time. One child was very hesitant to create anything at first and struggled to make basic shapes, but within minutes began creating shockingly elaborate towers with variable widths." -Brenden at East Bonner Co Library

On straw rockets: "The first attempt was a little disappointing for all, as the expectation of the 'launch' was bigger than what actually happened. We discussed what the problems could be and the students went back to adjust their straw rockets for another round. Some of the straw rockets did way better on the second launch and some still needed to be adjusted." -Mindy at 4-H Friday Friends in Boundary Co

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

## Tips and Tricks

Who knows more about leading TMC activities than your fellow TMC Labs educators? Nobody, that's who! Here are some tips directly from TMC leaders on how to make things run smoothly.

- Plan ahead and get supplies out before hand. Be ready for the kids when they arrive.
- Prep your materials, depending on the age and ability of your group. For example, store-bought cardboard craft tubes are thicker than reused toilet paper and paper towel tubes. Young kids can struggle with cutting or punching holes in these tubes, so you can pre-cut or pre-punch them.
- When using TMC materials with limited adult helpers, have all the children in one group. Older children can help and encourage the younger ones.

-Amy Post, TMC Coordinator, ION

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# The Makerspace Playbook

Issue #25: October 2023

## TMC ON THE MOVE: PREPPING FOR WINTER

Each of us may have different degrees of winter, but this still is an excellent opportunity to schedule time for a thorough walk-through of your mobile makerspace. Summers are busy and we may not have done a great job of inventorying and cleaning as we should. When prepping for winter, make sure to pull out any items that might not store well. For us, we pull out vinegar as an exploding gallon in a trailer made for some interesting cleanup. I would recheck items that sometimes react to varying temperatures: crayons, playdough, plastics, etc. The integrity of these items may change after they have been stored in hot/cold temperatures, and this would be a good time to replace them. Batteries can winter over but check to make sure they are still stored separately and safely. Remember to consider the outside of the trailer as well. Check wheel bearings, brakes, door hinges, and all the trailer connections as these are used often and should be in top repair.

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



## Spotlight on You: City Build 2040

Students at Oakland-Craig Public School had the privilege to take part in City Build 2040 during their summer program. The activity was led by 2 Oakland Craig high school students over the course of 4 days. The first 3 days focused on designing and building. Students were put into groups of 3-4 to build a section of their city. On the fourth day, students rushed to complete their section of the city so they would be ready to present to parents and community members about how they envision Oakland, NE to look like in year 2040. They also rehearsed our speeches and collaborated with their classmates to see how each of their sections interconnected.

Parents and community members arrived around lunchtime and were greeted by students. Participants stood in a large circle around the city so that each group could say something about their section. We concluded the event with a nice lunch and conversation. One other group leader said "I worked with the 1st and 2nd graders. Every day the students loved walking into the commons to see what had been added to the City Build. They loved seeing what had been built and commenting on what they would have done. They hope to do it when they are older!"

~Alana Pearson, Community Support and Innovation Specialist -  
Nebraska Children and Families Foundation

# Give It a Try: Fall Paperweights

Welcome autumn with this fun and easy keepsake craft! First, collect some small, fall leaves and smooth rocks that fit nicely in the palm of your hand. In a disposable container, mix up the decopage glaze with water and white school glue (a.k.a. Elmer's glue), using a ratio of 2:1 (2 oz. of water for every ounce of glue). Clean your rock, then paint the top and sides of your rock with the glaze. Arrange your leaves in a design on your rock, trimming the leaves if necessary. Paint over the leaves with the glaze. You can layer the leaves, painting a layer of glaze over the leaves each time you add a new one. Let dry for at least 24 hours. When the glaze dries, it will permanently stiffen the bristles of your brush, so wash them immediately, or use throw-away brushes. You can pair this activity with [this information](#) from the Smithsonian to create a lesson on why leaves change color in the fall.



## Put it Into Practice: Hands-on with Disabilities

Our youth programs work hard to make sure all feel welcome; however, just having someone new at the activity table might not be enough. Consider the materials you use, the activities you are facilitating, or the words you say to ensure everyone feels welcome and that they can participate. Often, we may not even be aware someone has a disability. Take the time to meet with parents and guardians as they drop-off or pick-up, even encourage them to stay and help out. This will help you learn more about the youth and what support is needed, or not needed. Encourage the youth to submit their ideas on different topics, sometimes this might not be available ahead of time, but during. If it is during, let them select from activities you have already prepared. Allowing them to have input will help you see comfort and excitement levels, but also any hesitancy or communication barriers. There is not a one-size fits all to this topic, but if you engage the youth and their family, or strategize on how to gauge your audience, you are already working towards positive outcomes for all.

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

## Tips and Tricks

To continue making our programs welcome for all, be observant and flexible.

- Take the extra time to prep a few materials ahead of time so someone is still able to participate without being singled out (for pipe cleaner bracelets, maybe strip the ends for a stronger connection for an autistic youth who may struggle with those fine motor skills).
- If it is a new audience to you, perhaps start with an activity that is a little bit simpler rather than jumping straight to expert levels.
- Finally, make sure to teach terminology, but avoid words that may be too large or foreign.

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

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# The Makerspace Playbook

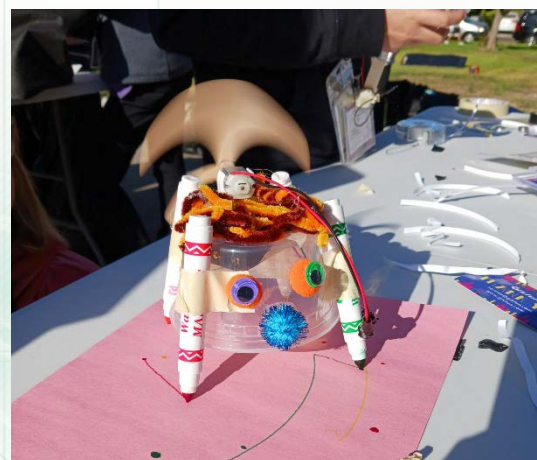
Issue #26: November 2023

## CAREER SPOTLIGHT: REGISTERED DIETITICIAN

Do you love food, cooking and helping people get healthy through what they eat? A future career as a Registered Dietitian (RD) may be for you! Dietitians are considered food experts who work in a variety of settings including hospitals, clinics, sports and community organizations, schools, and in food research.

Dietitians have a strong educational background, completing both a bachelor's and master's degree before becoming licensed. They take many courses in chemistry, food science, community nutrition, public health, anatomy and physiology. RDs use their knowledge and skills to educate their patients and clients about the importance of eating healthy foods, evaluate their current diet and help them create meal plans. The RDs often work as an integral member of a healthcare team with their overall goal to improve the patient's health and reduce their disease risk through what they eat.

~ Emily Kranz, Health and Physical Activity Field Specialist, SDSU Extension



## Spotlight on You: Treasure Valley YMCA

It should come as no surprise that YMCA afterschool programs have a strong physical activity aspect. But did you know the YMCA's afterschool program also incorporates STEM? Yep, the YMCA finds that physical activity and STEM is a winning combination. Physical activity is critical because kids spend most of the school day sitting. So, if you want to attract kids to an afterschool program, physical activity must be a component. And boy, does the YMCA incorporate STEM concepts! For example, they have kids run with resistance parachutes. Here kids explore how parachutes create drag while they run at various speeds. Kids love it and they're getting physical activity while learning STEM concepts without sitting in their classroom seats.

The YMCA in Canyon County, Idaho sees between 250 and 400 people at each of their family events, and served over 6,000 people last year. They serve so many families in part because they travel to 14 school sites in the Treasure Valley over the summer. The YMCA is open to supporting more schools and events; the host just needs to arrange for a few logistical issues (like storing the trailer onsite). But hurry! The YMCA often schedules six months in advance. Now that's the sign of a popular program!

The YMCA recognizes that kids often don't get enough STEM exposure at school. So, they'll continue to write grants and get donations to keep their trailer stocked with supplies. This way they can be a powerful contributor to the kids of the Treasure Valley, giving them a large dose of physical activity that promotes health while serving them with mental activity that gets them ready for STEM careers. By the way, do you know anyone who wants to get rid of a double decker trailer? The YMCA program is so popular that they could use one!

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

# Give It A Try: Sanford Fit

After time creating and building, it is important to take a few minutes to move around. Sanford Fit has a variety of lessons and activities that can help you get your youth moving. Give some deep belly breathing a try during High, Low, Buffalo Yoga, or challenge your youth to some bear crawl basketball. Our South Dakota TMC trailers have these awesome brain energizers, and you can access these resources as well at their website: <https://fit.sanfordhealth.org/>

~ Christine Wood, 4-H STEM Field Specialist  
SDSU Extension



## Put it Into Practice: Brain Breaks and Physical Activity

Moving our bodies throughout the day is an essential component of overall health. In addition to the cardiovascular health benefits that come from regular physical activity, one can also expect a reduction in stress, enhanced sleep quality and better mental health.

Brain breaks and physical activity can enhance cognitive function by increasing blood flow to the brain which can lead to improved concentration and memory. Taking a break from mental tasks can also help prevent mental fatigue and improve mental clarity. Following bouts of physical activity, individuals can also benefit from increased learning and retention and improved creativity and problem-solving skills. The goal is to reach 150 minutes per week of moderate-intensity physical activity (elevated heart rate, such as brisk walking or dancing) and every minute throughout the week adds up. So incorporating little breaks into your day to get moving can have lasting benefits.

~ Emily Kranz, Health and Physical Activity Field Specialist  
SDSU Extension

## Tips and Tricks: Non-Candy Rewards

As a parent of Type 1 Diabetic, I never fully realized how many treats and candies were distributed until my son was diagnosed. This is not a bad thing; it is just not an option for our family. To think differently when serving our youth and families, here are a few other suggestions for some positive rewards that are not food. Below, each item is linked to Amazon, but can be purchased most anywhere and easily tied into your programming theme:

- [flashlights](#)
- [pop-its & other fidget toys](#)
- [fun pens](#)
- [stickers](#)
- [temporary tattoos](#)
- [bookmarks](#)
- [bouncy balls & sticky toys](#)
- [small easy build kits](#)
- [brick building kits](#)
- [stress/manipulative balls](#)
- [slime/goop/puddy](#)
- [post-it notes](#)
- [keychains](#)

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

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# The Makerspace Playbook

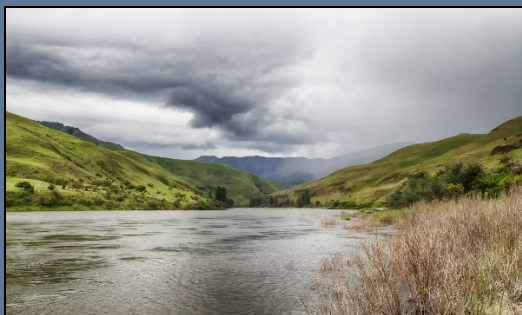
Issue #27: Dec. 2023-Jan. 2024

## CAREER SPOTLIGHT: HYDROLOGIST

Hydrologists follow the water. That means water's occurrence in the atmosphere (rain and snow), on the surface (snow, ice, rivers, and bodies of water), and underground (aquifers). A hydrologist describes and predicts these water resources. They describe current conditions, like snowpack, water flows through rivers, and the amount of water in lakes and reservoirs. They also predict upcoming conditions, like melting snowpack and future droughts.

Hydrologists find employment throughout industry and government (city, state, and federal level). The average hydrologist makes around \$84,000 per year and has a master's degree. To become a hydrologist, you should have a good science background in high school and then complete a hydrology degree at a college or university. Because of Earth's growing population and finite water resources, hydrologists remain in demand. So, if you enjoy laboratories and working outdoors, hydrology might be a good career for you.

*-Dr. Paul Verhage, TMC Labs AmeriCorps member, Idaho Out-of-School Network*



## Spotlight on Nebraska: Valentine Community Schools

The summer of 2023 was our first summer program and we knew we wanted to make the most use of our TMC trailer. As we began planning, we knew there were a couple of things we needed to gather: more supplies and a lot of recyclables. With the extra space in the trailer, we were able to receive and gather our recyclable supplies. With all the recyclables, we were able to accomplish two of our big plans. Our first was to start each day with Maker Space time for each age group. Each day we had a STEM Challenge, in which we were able to use all the extra supplies and recyclables. This allowed us to offer students lots of different choices for the supplies each day.

Another great thing we were able to put into our summer program was the ability to complete City Build 2050. The students were given the option to work individually or as partners. We talked about what businesses we would not only need in 2050, but also what businesses we would want. With the supplies that we had on the TMC trailer and the ability to keep all the cardboard we could gather, our students were able to build an amazing view of what they want and think Valentine, NE would look like in 2050.

To be able to watch our student's imaginations go so far and watch them create was so fulfilling.

*~ Rachele O'Kief, After School Program Director, Valentine Community Schools*

## Give It A Try: Recycled Christmas Lights!

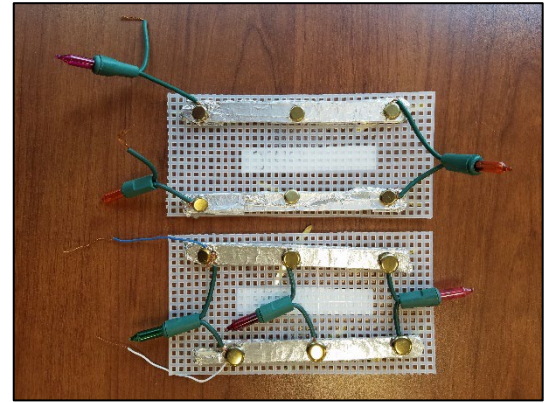
It's that time of year when there is an abundance of Christmas lights headed to the trash because they don't work. However, these strands of lights can still function to teach youth about circuits. The strands of lights can be cut up and the individual lights can be used in a variety of ways.

This basic lesson shows how to teach parallel vs. series circuits:

<https://iqa.airprojects.org/events/archive/2017-spring-conference/holiday-light-series.pdf>

Once youth are comfortable with how circuits work, they can use the lights to build circuits into popsicle stick structures and other types of builds.

*~Christine Wood, 4-H STEM Field Specialist – SDSU Extension*



## Put it Into Practice: Snow as a Phenomenon

Scientific phenomena are real-world events or occurrences that exemplify a scientific idea. Phenomena can help engage youth's curiosity and capture their attention. They can also help guide students to use scientific thinking, understand scientific concepts, and practice science and engineering practices. Educators can use phenomena as a theme for science units or as a starting point to guide scientific exploration through STEM activities or inquiry.

Snow as a scientific phenomenon could lead to explorations of cause and effect (temperature changes, states of matter, climate change), patterns (snowflake shapes and crystallization), or structure and function (plant and animal adaptations to winter). Youth could engage in science and engineering practices by doing experiments with snow water content, or making observations about weather patterns, snowpack, or animal tracks in the snow. The possibilities are endless! Embracing snow as a learning opportunity can help make the cold, dark winter months a lot more fun and engaging!

Links to some fun and useful info on phenomena and snow science:

- [Idaho Phenomena](#)
- [Snowflake Science](#)
- [Snow science lessons by the Winter Wildlands Alliance:](#)
- [Phenomena for NGSS](#)

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

## Tips and Tricks: Snow Science

It's snowing, now what are you going to do for a science activity? Well, how about looking at snowflakes through a magnifying glass or microscope?

Start by spraying a clean glass microscope slide with hair spray. Then place the tacky slide outside until at least one snowflake lands on it. Cover the slide with a box to prevent other snowflakes from landing on it while the hair spray dries outside. After drying, the slide will have a cast of the snowflake that you can observe under a microscope. That's pretty cool (get it?)!

You can find more information at [THIS LINK](#).

*- Dr. Paul Verhage, TMC Labs AmeriCorps member, Idaho Out-of-School Network*

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