



Kwul 'Itkin

SALISH PEND D'OREILLE KOOTENAI

MAKER TRUCK





The K^wul 'I'tkin Maker Truck

is a mobile, cultural makerspace co-created by spectrUM, CSK Tribal Education, SciNation, and tribal elders on the Flathead Reservation. In August of 2016, spectrUM and the Confederated Salish and Kootenai Tribes were awarded an NSF EAGER award to inspire the Flathead Indian Reservation's next-generation workforce through mobile, cultural making. The SciNation team purchased a Ford Transit Van and began to re-imagine the van into a mobile makerspace, equipped with a laser cutter and 3D printer.

The name of the Maker Truck comes from the Salish and Kootenai words for "to make". With support and input from both culture committees, the K^wul (Salish) 'I'tkin (Kootenai) Maker Truck was born. The SciNation team met with both the Salish Pend d'Orielle and Kootenai Culture Committees to determine appropriate activities to develop for use with the K^wul 'I'tkin Maker Truck. Beading, drum making, and basket making activities are available in this curriculum guide.

The Maker Truck is now available to travel to schools and community events across the reservation to engage K-12 students with hands-on STEM activities that weave together cultural and conventional forms of making.

Turn to page 5 to read "Cocreating Transformative Change: Making Collective Impact with the Flathead Nation", an article featured in Connected Science Learning about the process of developing the Maker Truck.





Indian Education for All addressed in Maker Truck Curriculum:

The activities in the Maker Truck curriculum support Indian Education for All, and address the Essential Understandings Regarding Montana Indians. Specifically, through these activities, educators explore these understandings with their students:

Essential Understanding 1

There is great diversity among the twelve sovereign tribes of Montana in their languages, cultures, histories, and governments. Each tribe has a distinct and unique cultural heritage that contributes to modern Montana.

- This curriculum specifically addresses the unique languages and practices of the Kootenai (Ksanka), Pend d'Orielle (Q'lispe), and Salish (Se'lis) tribes.

Essential Understanding 2

There is a great diversity among tribal nations, and there is great diversity among individual American Indians as identity is developed, defined, and redefined by entities, organizations, and people. There is no generic American Indian.

- Please take a moment to explore the role models of the Maker Truck and SciNation, found at www.spectrum.umd.edu. They demonstrate the uniqueness and diversity among individual American Indians.

Essential Understanding 3

The ideologies of Native traditional beliefs and spirituality persist into modern day life as tribal cultures, traditions, and languages are still practiced by many American Indian people and are incorporated into how tribes govern and manage their affairs. Additionally, each tribe has its own oral histories, which are as valid as written histories. These histories predate the "discovery" of North America.

- The activities in this curriculum are designed to allow students to explore the Salish and Kootenai languages and the traditional practices of making a drum, beading, and basket making. Stories in the additional resources share stories of the Salish, Pend d'Orielle, and Kootenai people.

The K^wul 'l'tkin Maker Truck was developed with an EAGER grant from the National Science Foundation (award #1623554).

Montana K-12 Science Standards Addressed in Maker Truck Curriculum

Physical Science K-2	KINDERGARTEN	1ST GRADE		2ND GRADE	
	Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object	Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can cause materials to vibrate	Design a solution or build a device that facilitates communication over distance using light or sound	Plan and conduct an investigation to describe and classify various materials by their observable properties	Conduct an investigation and analyze data to determine which materials have the properties best suited for an intended purpose
	Beading	X		X	X
	Drum Making	X	X	X	X
	Basket Making	X		X	X
Physical Science 3-5	3RD GRADE	4TH GRADE			5TH GRADE
	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object	Make observations to provide evidence of transfer of energy from place to place by sound, light, heat, and electric currents	Design a solution or build a device that facilitates communication over distance using light or sound	Generate and compare multiple solutions that use patterns to transfer information	Observe and record qualitative and quantitative evidence to support identification of materials based on their properties
	Beading	X		X	X
	Drum Making	X	X	X	X
	Basket Making	X			X
Physical Science 6-8 and 9-12	6TH-8TH GRADE		9TH-12TH GRADE		
	Gather information to describe that synthetic materials come from natural resources and impact society	Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object	Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes forces on an object during collisions	Design, build, and refine a device that works within given constraints to convert one form of energy to another form of energy	
	Beading	X			
	Drum Making	X	X	X	X
	Basket Making	X		X	
Earth and Space Science	5TH GRADE	6TH-8TH GRADE		9TH-12TH GRADE	
	Gather information to describe that synthetic materials come from natural resources and impact society	Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object		Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes forces on an object during collisions	
	Beading	X			
	Drum Making	X	X		X
	Basket Making	X	X		X

Cocreating Transformative Change

Making Collective Impact with the Flathead Nation

Holly Truitt, Ruth Swaney, William Swaney, Nick Wethington, and Nathalie Wolfram



Figure 1: The Kwul 'Itkin Maker Truck reflects the visual identities of the Confederated Salish and Kootenai Tribes and spectrUM, as well as the local geography of the Flathead Reservation.

This article was originally published in Connected Science Learning on September 18, 2018
<http://csl.nsta.org/2018/09/cocreating-transformative-change/>

Leveraging community to create a mobile, cultural makerspace that travels to schools, powwows, and community events throughout a Native American reservation in Montana.

During a summer 2015 planning session, the University of Montana (UM) spectrUM Discovery Area and our SciNation advisory group on the Flathead Reservation took a hard look in the mirror. With the motto to “just add STEM” (science, technology, engineering, and math) to community gatherings and schools, we had together built a robust portfolio of programming that regularly engaged the reservation’s 1,200 Native K–12 students in:

1. an award-winning Science Learning Tent that popped up at the reservation’s powwows,
2. “Science Bytes” that embedded role models and hands-on STEM activities at summer free meal sites,
3. community family science nights, and
4. in-school pop-up exhibitions.

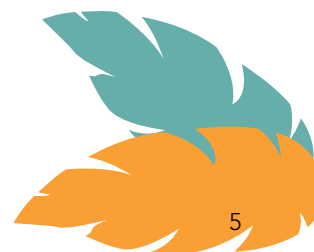
SpectrUM, a hands-on science center based in Missoula with statewide mobile programming, engages over 200,000 Montanans annually, including over 8,000 K–12 students and their families on the Flathead Reservation. Our SciNation advisory group had formed in 2013 with seed funding from the Noyce Foundation and later the Alfred P. Sloan Foundation. Collectively, we sought to reimagine spectrUM’s existing programming on the Flathead Reservation as culturally relevant, rich with Native and local STEM role models, and aligned with the Confederated Salish and Kootenai (CSK) Tribes’ workforce priorities. When spectrUM replaced our go-it-alone, organizationally bound work with a community-based, cocreative approach, increased interest, awards, and funding followed: from the Noyce Foundation, the Simons Foundation, the Coalition for the Public Understanding, and an array of federal and private foundation funding sources.

Yet we realized we were struggling to offer programming in technology and engineering, one of the tribes’ workforce priorities. And despite the strides we had made in cocreating culturally relevant STEM programming, we were falling short in providing tech programming, as well as in offering STEM engagement that is culturally relevant throughout. Taking a “balcony” view, we looked at models such as the Spark Truck, a mobile makerspace developed at Stanford and now operated out of the Deason Innovation Gym at Southern Methodist University. We asked questions such as:

- What would a mobile making experience look like on the reservation?
- How might it become uniquely of the community?
- Who might be key partners in designing the truck and its activities?



Figure 2: Salish elder Eva Boyd guides SciNation member and former tribal education director Bill Swaney and spectrUM partner Dr. Ruth Swaney in a basket-weaving activity as part of the codesign process.



What we're finding

This project used a community-based, participatory research model in which the community codesigns the research questions, methods, and protocols (Harding et al. 2012). Dr. Blank and the project team met with the Tribal Council, culture committees, and SciNation to shape and refine the central research question: "Does community involvement in cultural makerspace programming advance design thinking and capacity to participate in making?" At these meetings, members of the tribes identified existing cultural making practices that they considered appropriate to include in this project—including basket-weaving, drum-making, and beading—as well as other cultural practices that they deemed sacred or otherwise inappropriate for this project. Mindful of well-documented harms that have resulted from research conducted "on" rather than "with" Native American tribes, the Tribal Council also worked with Dr. Blank and our project team to codesign survey and interview questions, as well as to define how and with whom the resulting data could be shared. Throughout, tribal members have shared in the process, methods, analysis, and results of the project.

We began with a pilot study and brought the results to Tribal Education and other community partners to review and refine before we scale-up this year. Although time-consuming, this tribal-university participatory approach builds trust and helps ensure that the research benefits the community. We are also finding that it is building capacity: After reviewing this project's pilot findings, both Tribal Education and a collective-impact college and career readiness project based at Salish Kootenai College have decided to adopt the same questions in their own program research and evaluation.

Early findings from the project's pilot research suggest that cultural making activities spark greater engagement. Dr. Blank, then a professor of education at UM, found that in the informal setting of powwows, children spent an average of 29 minutes at cultural STEM making experiences versus seven minutes at noncultural STEM making activities, with equal participation by males and females. Adults were also more likely to engage with their children at the beading and drum stations (Blank and Truitt 2017).

Dr. Swaney, who facilitated the project's activities at powwows, noted that the activities also provided entry points into culture as well as STEM; she said, "When we introduced the beading activity, young people enjoyed the laser-printed images of wildlife, which created an opportunity to talk about wildlife biology or their own observations of those species. To a certain extent, we could also apply a cultural overlay from our community to some animals as they related to the oral histories of tribes, bringing an additional perspective of animals to youth that they might not get in a mainstream educational setting."

Pilot research conducted on the project's classroom engagement similarly indicates that cultural making offers new entry points for K–12 students into making and design. For example, of 78 students surveyed at five middle schools on the Flathead Reservation after participating in the project's basket-weaving activity,

- 81% strongly agreed or agreed that "During this activity, I was focused on learning about the design process most of the time,"
- 71% strongly agreed or agreed that "During this activity, I learned a lot about how to plan and design," and
- 68% strongly agreed or agreed that "After doing this activity, I am excited to make and design other projects."

Responses to the open-ended survey question, "A design project I would like to make now is ... because ..." suggest that students recognized and valued the activity's cultural component. Sample responses included: "Bead, beading is a great way to allow my imagination to flow. You can create countless designs. Because my family is very talented in beading ..."

"and "... I liked the baskets but I would like to make coultral stuff because I liked to learn about coulture."

		School					Total
		Dixon	Hot Springs	Polson Middle	Ronan Middle	Two Eagle River	
After doing this activity, I am excited to make and design other projects	Strongly Agree	20.0%	46.7%	40.0%	16.1%	37.5%	29.7%
	Agree	20.0%	40.0%	33.3%	38.7%	50.0%	37.8%
	Disagree	60.0%	13.3%	20.0%	35.5%	12.5%	37.0%
	Strongly Disagree			6.7%	9.7%		9.4%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Preliminary findings suggest that the cultural making activities can fuel students' interest in pursuing design and making.



Figure 7:
A child in powwow regalia at the Standing Arrow Pow Wow completes a beading pattern.



Figure 8: A completed beading project, with a laser-engraved fish designed by UM's Flathead Lake Biological Station to feature local, native wildlife.

Lessons learned on cocreating community-based collective impact

During the period since spectrUM adopted a community-based, collective-impact approach throughout our work, we have grown from engaging 50,000 people to 200,000 people annually. In Missoula, we have opened a first-of-its-kind learning center, EmPower Place, which is embedded in our local food bank and devoted to providing rich science museum and library programming to children and families experiencing food insecurity. With cross-sector partners, we are two years into cocreating a robust maker culture in rural schools in the Bitterroot Valley; partly as a result of this initiative, the community is using funds from a recently passed bond to create a makerspace within its school library. In Missoula, we are breaking ground on a beautiful new culture house that will bring spectrUM, our public library, and Missoula's children's museum under a single roof, with free admission. spectrUM now regularly receives invitations to help others around the nation develop their own community-based, cocreative efforts.

On the Flathead Reservation, spectrUM and SciNation's cocreative work most recently garnered an award from the Montana Indian Education Association. As a case study in community-based collective impact, the K'ul 'I'tkin Maker Truck offers lessons for other communities, higher education institutions, museums, and K-12 schools interested in adopting a similar approach to codesigning highly localized and community-driven STEM and making initiatives, especially in Indian Country. Below are some of the key lessons we learned in this collective-impact approach:

- 1. So basic, but all too often forgotten: Relationships first. Always.** We are often so focused on the end product that we forget to pay attention to the process and the glue that holds the process together: our cocreators. Relationships first, cocreation second, as the cocreative process is only as strong as the trust in the room. To cocreate, you must listen to each other, dream together, and recognize and value one another's unique expertise. Our recommendation is to share food, meet monthly, build relationships, and, of course, cocreate. This is especially true when working with tribal communities. In our work, relationships have been fostered over many years. We have found that you can only move as fast as the trust in the room.
- 2. Give the keys to the community.** The process of cocreation is a redistribution of power back to the community and is built on a foundation of trust and respect. By including community in all aspects of the process, partners invest time and resources and take ownership of both wins and challenges. Moreover, we are finding that when higher education designs with community capacity and ownership in mind, better solutions, deeper social impact, and stronger goodwill and collaboration result, particularly with underserved communities that often feel (and have been) overlooked by academic institutions and museums.
- 3. Never problems, always wicked opportunities.** In the social sciences, "wicked problems" are those complex, persistent problems such as hunger or homelessness that no single organization could solve on its own or with a single intervention. Our cocreation process focuses on harvesting "wicked opportunities" rather than combatting problems. This asset rather than deficit approach allows us to collectively adopt the growth mindset that we in education so often prescribe to our young makers. Too often in the informal science and higher education world, we build a case and frame a community by what is absent rather than what already exists or might be leveraged or cocreated within the community. Dr. Heather Cahoon, a celebrated poet, policy analyst, and enrolled member of the Pend d'Oreille Tribe on the Flathead Reservation, recently shared that "a very common saying in tribal communities is that if the problems are in the community, the solutions are in the community." We need to focus on these solutions.
- 4. Think like a gardener: Know your community's soil and cocreate accordingly.** The soil of a community matters when trying to create transformative change. By "soils" we mean "place," including a community's economic landscape, local career and educational pathways, culture, history, and, perhaps most importantly, its hopes and dreams for its next generation. Bold things happen when we codesign spaces, programs, and experiences that are of the soils of the community, drawing from their knowledge, economy, workforce and educational needs, and culture rather than simply importing cookie-cutter approaches. Recent research suggests that clear pathways into local industries are among the factors that contribute to a child's upward mobility (Rothstein 2017); in other words, community soils matter.
- 5. Culture + STEM = Expanded relevancy, broadened partnerships, and diversity of design questions, opportunities, and entry points.** By bringing new, heterogeneous voices to the table, we began to ask new design questions that led to novel approaches to our STEM and making experiences on the Flathead Reservation. Our boldest question was: How might we bring a cultural overlay to our maker truck? And who might we empower to lead these design efforts? How might cultural making impact K-12 learners and their families' engagement with STEAM (science, technology, engineering, art, and math)? These questions led to new and deeper partnerships. Montana's Indian Education for All constitutional mandate, CSK Tribal Education, and the tribes' culture committees were powerful champions for weaving STEM and culture together. By bringing STEM champions arm and arm with tribal elders and knowledge keepers, the K'ul 'I'tkin Maker Truck is opening new entry points for Native K-12 students who might come for the culture but stay for the STEM.

Anu Partanen (2018) describes a "Nordic theory of love" as a state of equity of all relationships, including through the design of policies and systems that free individuals from dependency. She writes, "the express purpose of this freedom is to allow all those human relationships to be unencumbered by ulterior motives and needs, and thus to be entirely free, completely authentic, and driven purely by love." Cocreation works to do this for us and our community partners, transferring power to allow us to become equals working on innovative new models that are of the community, grounded in authentic relationships, and aligned with the very human, shared purpose of bettering the lives of our next generation. This process ultimately allows us to ask again and again the same vital questions: To what end do we cocreate? Where are there gaps between what we created and the change we want to see in the world? Who in our community should we invite to help us be the change?



Figure 8: Designed for facilitation in classrooms, the basket-making activity uses cardboard and lanyard in place of cedar bark and cordage.



ACTIVITY: MAKE A DRUM

Create a drum using common craft materials, laser-cut drum heads and traditional techniques.

See
page 22
for the link to
Instructables
step-by-step
guide.

Time Needed:
30-45 minutes

SUPPLIES

- 3" diameter by 18" long by .070" thick snap-seal cardboard mailing tubes cut into 2" lengths. Available from Uline, Item number S-637
- Tyvek mailing envelopes, 12" x 15.5" pre-cut into 3.5" rounds with holes on the laser cutter. Available from Uline, item number S-5155
- Rex Lace plastic beading and lanyard material (or equivalent) of various colors
- Electrical tape of various colors
- Scissors
- Push pins
- Wooden sticks 1/4" in diameter cut into 4" lengths, available from local craft stores or Amazon
- Felt pieces, cut into small strips
- Hot glue and glue guns

OPTIONAL

- Leather hole punch
(to make drum heads without laser cutter)
- Simple circle-drawing compass
(to make drum heads without laser cutter)
- Microphone with 1/4" audio jack output
- Speaker/amplifier with 1/4" audio jack input
- Loop Pedal - Boss RC-1 Looper Station
- Piezo microphone with 1/4" audio output jack
- 1/4" audio patch cable
- Ampridge GA101 Jam Cable Dual
Adapter 1/4" stereo cable

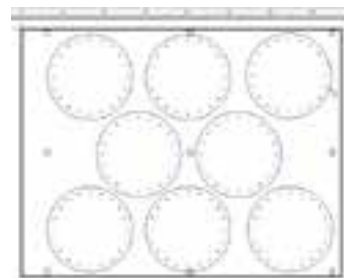
Engage

Ask the students if they have ever made a drum or seen a drum being made before. How are drums traditionally made? Drums have great significance to Salish, Pend d'Oreille and Kootenai peoples, and are used in ceremonies and celebrations. Traditionally, drums are made with a wooden base and rawhide as the drumhead. The rawhide is soaked in water and then is tied down with sinew. Once it dries, it tightens over the frame of the drum to create a membrane that resonates. In our version of the drum, we will learn how drums have been made, while using different materials for the base and drum head.

Preparation:

For further information about this activity, including files to download for laser cutting, please see the link to our online Instructables page in the Additional Resources section of this curriculum booklet.

In preparation, educators should have enough cardboard tubes for each student and a pair of mailing envelope circles for each student. Mailing envelopes should be laser-cut into 3.5" circles with holes around the perimeter. The file for these drum heads is named Drum Tyvek MkIII.EPL on the maker truck computer. Place lanyard and electrical tape on the table so that students can easily access them.



Cut felt pieces into small squares or strips. Turn on hot glue guns and set up a gluing station.

If short on education time, teachers can pre-make the drum sticks by gluing a piece of felt to the end of a wooden stick. Lengths of lanyard (around 3 feet) can be cut ahead of time as well.

POINTER: It's easiest to cut the tubes in large quantities with a band saw with 24tpi blade, for small quantities a miter saw, coping saw or box knife can also work. Follow all safety precautions with regard to eye, limb and ear protection if using this equipment.



Students make a drum using pre-cut mailing tubes and mailing envelopes cut with the Kʷul 'l'tkin Maker Truck's laser cutter. Students learn manual dexterity, attention to detail, patience, and about the science of sound as well as traditional methods of making drums.

To make drum heads without a laser cutter:

If making without the laser cutter, use a compass to draw 3.5" circles on the tyvek envelopes. Be sure not to pierce through the middle of the circles if possible. Punch 1/8" holes around the perimeter of the circle, about 1/8" from the edge - 20 is a good number, experiment with more or less to see if it makes a difference in lacing or finished drum.

Explore:

Students will take a cardboard tube, and will decorate it with the colorful electric tape. It is easiest to wrap one color around the entire cardboard tube, but student can be creative and use multiple colors and make patterns. Ask students why they chose their colors.

Next, students will take 1 of the laser-cut mailing envelope sets, separate the two halves, and a yard-long length of lanyard to make their drumhead. If you are going for a more realistic look, sinew can be substituted for the lanyard and leather for the felt.

- Tie a knot on one end of the lanyard string. On the other end of the string, make sure it is cut at an angle to make it easier to push through the mailing envelopes.
- Line the mailing envelopes on both ends of the cardboard tube. Make sure that the circles on the mailing envelopes line up together, or you can offset their placement to create a cross-stitch if desired.

Use two to four push pins or masking tape to secure the mailing envelopes to the cardboard tube - this makes it much easier to work with.

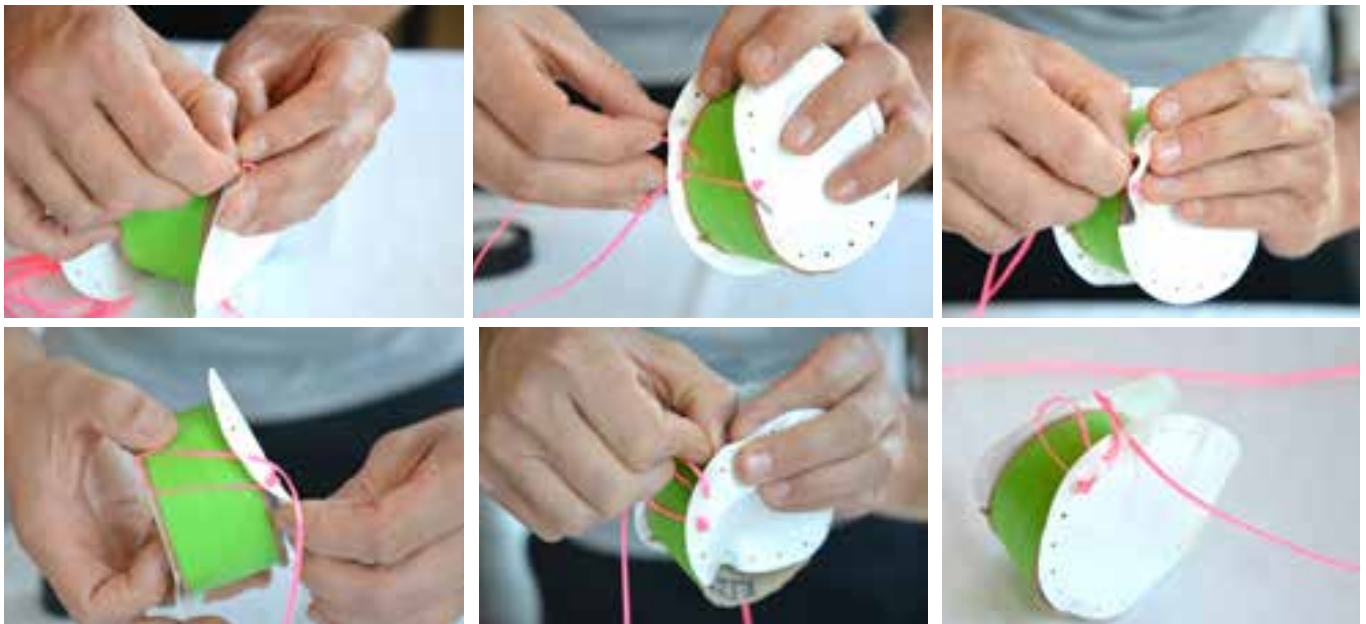
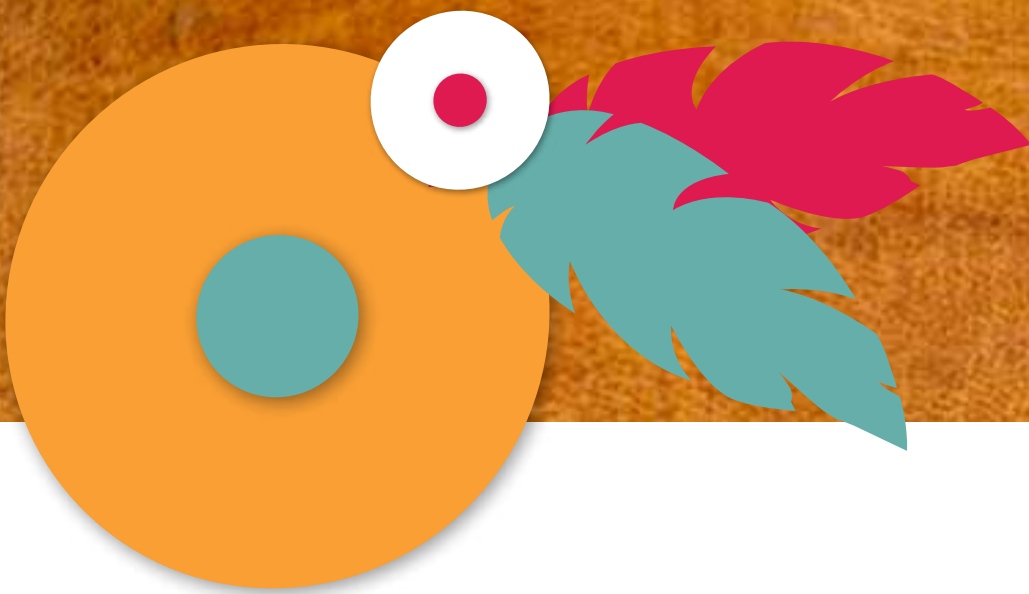
- Begin to string together the two mailing envelopes, going through each hole of the envelope. Students can do this in a number of different ways, following their own pattern.
- Remove the push pins or tape as you circle the drum with the string, placing them in other locations as necessary.
- Once you have circled the entire drum and laced through each hole, go back through and pull the string tightly so the drum head is tight on the cardboard tube - be sure not to pull too tight or you will tear out holes and possibly break the lace!
- Secure the string by tying a knot or by tying the two ends of the lanyard together. You can also make a large loop with the remainder to be able to have a handle for your drum.

Salish and Kootenai Language

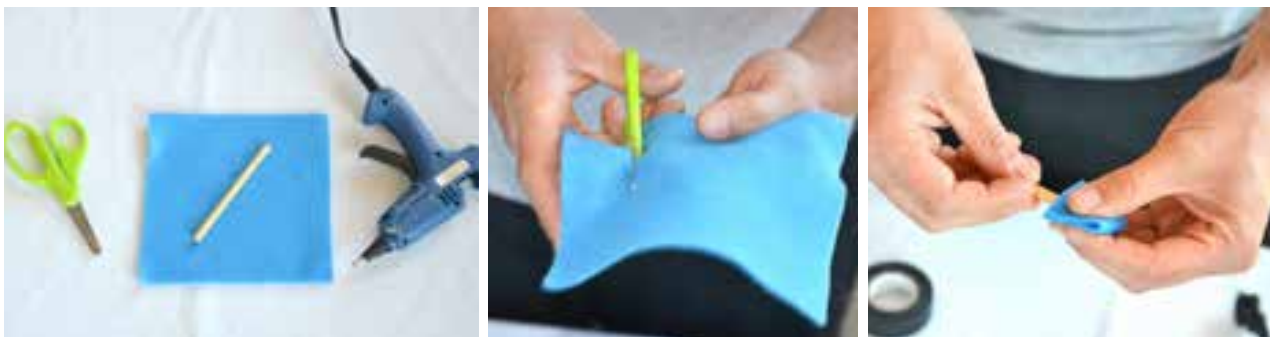
What colors of tape and lanyard are your students using for their design?
Can they say these colors in Salish and Kootenai languages?

Turn to page 21 to see the written words for the colors in Salish and Kootenai languages. Turn to page 22 for information on how to download the language apps to hear their pronunciation.





Next, the students should make the drum stick. Take a small wooden stick and a piece of felt, and hot glue the felt to one end of the stick. Students may also choose to use the lanyard string to tie the felt to the stick, and decorate the stick with lacing or extra felt if there is time.



Yamncut means “gathering of the people.” A family drum group started by Johnny Arlee, which sings Traditional songs that have been handed down from generation to generation.



Explain and Expand

Students can share their creations with the class/group.

Questions to ask:

- Why did you choose the colors and patterns you did?
- What was your favorite part of doing this activity?
- What was difficult or gave you the most problems?

Students can now use their drums and explore the science of sound. Using their drums, other drums provided, a speaker, loop pedal, microphone and piezo microphone, students can make their own music and explore how sound is made from vibrations. See setup information for the optional looper station on page 14.

Evaluate:

- What does your drum sound like? How does its sound compare to other drums with the same or different stitch pattern?
- How does making the drum head tighter or looser change the sound? What about squeezing the drum while tapping it with the stick?
- Why do different materials make different sounds?
- What would your drum sound like if it only had one side covered with a drum head instead of both?
- Can you make a song with the loop pedal and your drum?

A historical photo of a Native American man beside a large drum at the Missoula Fair Grounds, Montana.



From Archives & Special Collections, Mansfield Library, The University of Montana-Missoula



Optional setup information for the piezo and audio microphone looper station:

To set up the looper microphone station, attach all items as indicated below.

- The patch cable goes between the input jack of the amplifier and the Power ON/Output A jack of the pedal. This turns on the loop station.
- The dual cable adapter (Y-shaped) cable plugs into the Input A jack.
- Both the audio microphone and piezo microphone can plug into the dual cable adapter.
- You will need to adjust the volume, tone, and drive on the amplifier to eliminate feedback and achieve an appropriate volume for the classroom or venue. The level of the loop station can also be adjusted.
- You can sing into the microphone and place the piezo microphone on various items to amplify the sound. Try looping in multiple sounds to create a song!

START LOOPING WITH THE **BOSS RC-1** IN THREE EASY STEPS.



Bead a necklace, medallion or earring piece, and learn various sewing techniques.

Explore your creative and artistic side! Students make a beaded item of their choice that they can make into a necklace or medallion piece, or more advanced students can use a smaller piece that turns into an earring. Students learn manual dexterity, attention to detail, and patience.

See page 22 for the link to Instructables step-by-step guide.

Time Needed:
one class period

Engage

Ask the students what kinds of animals or images are represented on the cabs. Some of the cabs have images that may have cultural significance to Native people as well. Ask them what they know about the images and invite them to share their knowledge. Ask why they have chosen a particular image to use in their beadwork. Ask about the colors students have chosen and why those colors appeal to them.

Preparation:

For further information about this activity, including files to download for laser cutting, please see the link to our online Instructables page in the Additional Resources section of this curriculum booklet. Cabs can be cut on the truck's laser cutter, or made of other materials beforehand. The files for cabs on the truck's computer are Bio Station Asst. Sheet.EPL, Scination Pendant.EPL, and Scination.EPL. Teachers can choose to glue down cabs of various sizes and designs ahead of time. This will greatly speed up the process. Teachers are also less likely to over apply the glue, which can make beading next to the edge of the cab difficult. It is usually best to keep the different colors and sizes of beads in separate containers. If facilitating without laser-cut cabs, other materials can be used such as stones, stained glass, acrylic plastic, etc. Lengths of thread can be cut ahead of time and needles threaded and the ends knotted as well. It is helpful to have finished examples of beadwork available for the students to view.



Salish and Kootenai Language and Culture

What animals are shown on the wooden cab?
Turn to page 22 for information on how to download the Animal Field Guide app to learn about these animals and their cultural significance.

SUPPLIES

- Beads of various types such as pony, crow, seed, elk teeth, trade beads and quills - seed beads of size 6/0 tend to be good for most ages and manual dexterity levels, as are pony beads, available from shipwreck.com in large quantities or the People's Center in Pablo, MT
- Thread - nylon thread is strongest and threads easiest through the pellon, Nymo size D or similar is a good option
- Needles - size 10 tapestry needles work best
- Pin cushion to safely store needles
- Pellon craft fuse material size 808
- Glue
- Scissors
- A wooden piece (in this case created by the laser cutter on the maker truck) generally called a "cab"
- Felt, leather or another material to back the beaded item

OPTIONAL: Needle-nosed pliers to pull needle through leather or thick material if needed

OPTIONAL: If the thread is difficult to work through the material, run it through candle wax - blocks of beading wax are available at most craft stores



Lo-me Standing Bear 'Koli-t-iviot (Hard Worker) Lomee Joseph', with roached headdress, long braids, and beaded vest and belt.

From Archives & Special Collections, Mansfield Library, The University of Montana

Explore:

Students should be encouraged to use any type and color of beads that appeal to them, and to bead as many times around their cab as time allows or they choose. Many times a single row around is all that is needed. When the cab is completed, the student may also wish to make a string of beads to attach to the cab to make it into a necklace piece. Let them experiment with bead types, sizes and colors to create their piece.

- Thread your needle with a length of thread and knot the end (if not already done ahead of time).
- Select your beads.
- Use a single needle technique as instructed, or a two needle technique for more advanced students. One way to think of this process is stringing 3-4 beads on the thread after poking through the back of the material, laying them next to the cab and poking back through the top, then coming back in the middle of this small string to fasten the thread to the material to keep the beads from flopping.
- Bead around the cab until you are satisfied - try adding multiple rows with different patterns!
- Glue a piece of leather, felt or other material onto the back of your beaded cab and trim the edges to make it nice and neat. For more advanced students, edge the piece with an additional row of beading.
- **Optional:** String a necklace for your beaded piece and make it into a necklace, add a hook to create an earring, or make a bracelet to incorporate it into.

Explain and Expand

Students can share their creations with the class/group. Questions to ask:

- Why did you chose the cab design you did?
- What was your favorite part of doing this activity?
- What was difficult or gave you the most problems?
- What other items could be used as cabs to bead around?
- What else could you make out of your cab after you bead it?
- What other kinds of materials could you bead on?
- Would it be easier or harder to bead without using the cab?

Evaluate:

- Why would you want to use the same kinds (sizes) of beads?
- Why would you put a piece of leather or felt on the back of your beaded piece?
- Do some colors look better together than others?
- How do different bead stitching techniques alter the pattern?

Salish and Kootenai Language

What colors of beads are your students using for their design? How many beads are they using? Can they say these colors and numbers in Salish and Kootenai languages?

Turn to page 21 to see the written words for the colors and numbers in Salish and Kootenai languages. Turn to page 22 for information on how to download the language apps to hear their pronunciation.

Make different styles of traditional baskets using everyday materials.

Create your own basket by making a version of a traditional cedar bark basket or sally bag. Students will develop their manual dexterity, attention to detail, counting skills and patience by creating two different styles of basket - cedar bark and sally bags. Applying design thinking, iteration and familiarity with materials will get them thinking like a maker.

See
page 22
for the link to
Instructables
step-by-step
guide.

Engage:

Basket making is among one of the oldest crafts practiced by Native peoples, including the Salish and Pend d'Oreille and Kootenai. Baskets in various forms are known, from archaeological projects as well as in contemporary times and through oral histories of many tribes. From historic through modern times, basket making is an artistic expression as well as a practical item used to carry just about anything. Most commonly today, baskets are typically used to gather plant materials, both food and medicinal.

SUPPLIES

- Photos of different types of baskets
- Maps of where baskets may come from
- Cedar-bark basket examples
- Sally bag examples
- Laser-cut cardboard templates (one per student) - cut from 11 x 17" chipboard pads, .050" thick available from Uline, item S-21526
- String
- Rex Lace lanyard or beading lace (or equivalent)
- 8-ply mop head #32, ABCO item number CM-7032 S
- Garden twine
- Thick yarn
- Scissors

Optional supplies:

- Crochet hook
- Sewing needle and thread
- Leather or fabric
- Leather hole punch
- Paper cutter

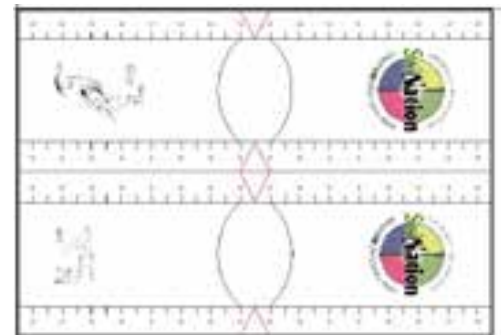
ASK STUDENTS:

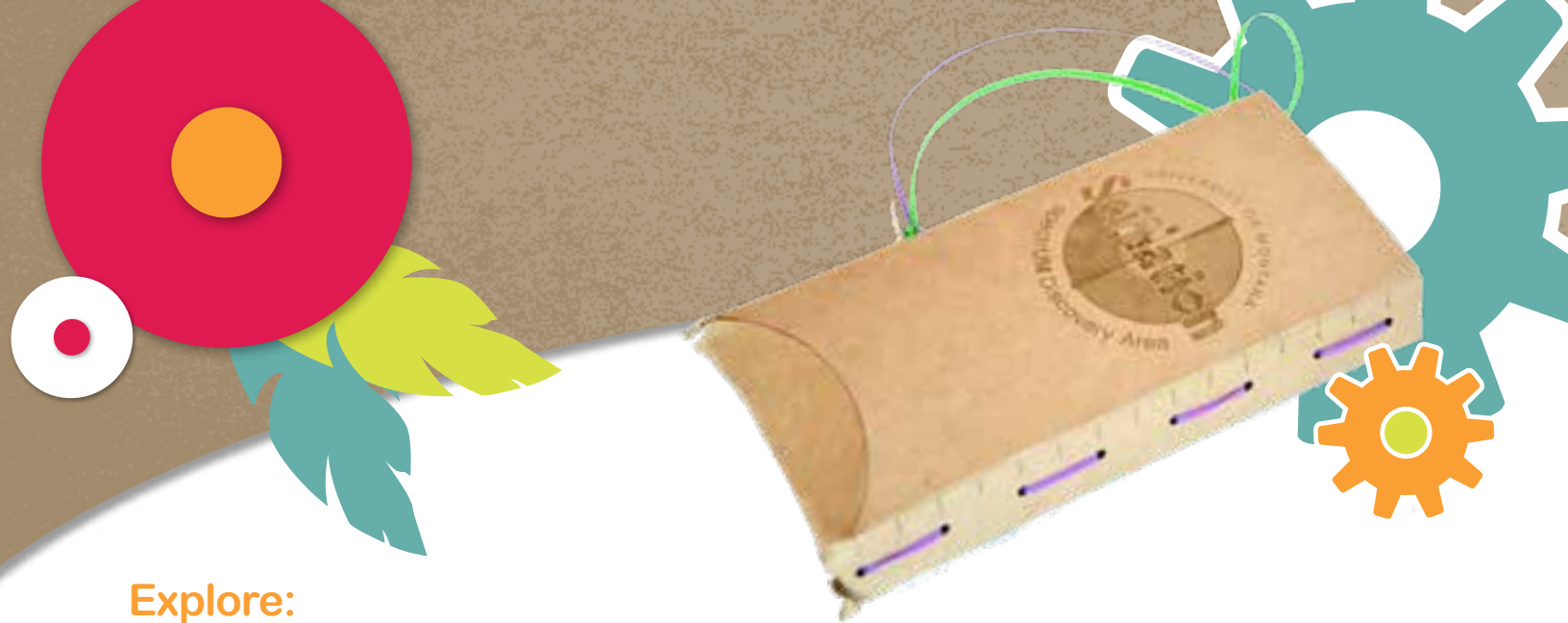
Based on what students may know about various tribes, ask them what types of plant materials may have originally been used in the weaving. Ask them what other kinds of materials they might be able to use today to make a basket. Ask students if they have ever seen other examples of baskets and if they knew what material was used to construct them (hints: pottery could be considered a form of a basket, cedar or other tree bark was commonly used for baskets, the husks from corn were used, pine needles, beargrass, and bulrushes or "tules" (too-lees) were used in weaving various items including baskets (the Salish people used bulrushes to weave mats that were then used as a lightweight summer tipi cover (a "tule tipi"). Also, students from other cultural backgrounds may have knowledge about other basket-making techniques they can share.

Show pictures and examples of different types of baskets, and ask students what materials they were made with, and where they came from, as well as what tribe or tribes may have made those baskets.

Preparation

For further information about this activity, including files to download for laser cutting, please see the link to our online Instructables page in the Additional Resources section of this curriculum booklet. Before facilitation, use the laser cutter to print the cardboard into the basket template. The file names for baskets on the maker truck computer are BasketsFoxHeron MkIII.EPL and BasketsEagleFish MkIII.EPL. Each pair of baskets takes approximately 15 minutes to cut. Cut a variety of styles so each student has a choice in which design they use. If not using a laser cutter or pre-cut basket templates, cut the chipboard pads in half with a sturdy paper cutter or razor blade and straight edge. Cut notches halfway along each piece on both long edges. Have the students punch holes with the leather punch, but keep in mind that young learners cannot easily operate the hole punch. Teachers can also cut the lace for baskets into 3-foot sections and twine for sally bags into 6-foot sections to speed up facilitation. Take the mop heads apart so individual strands are available. Set materials on side tables for easy access. It is helpful to have examples of real cedar bark baskets for students to inspect.





Explore:

Tell students: We are going to make a basket today that demonstrates some of the techniques of cedar bark basket making, without actually using cedar bark. If you would like, you may also get to try out the techniques of making a Sally Bag with mop heads and garden twine. We have used tools in our Maker Truck to prepare some of these materials for you. When you are making something, it may take more than one test, or iteration, to get it to a way you are pleased with it. There are ways to make a cedar bark basket that have been shared with us by the Native peoples - including the Salish, Pend d'Oreille and Kootenai - who have grown up making them and who have learned from the knowledge of their parents or grandparents. Today, we hope to share some of that with you, but we also want you to feel free to explore different ways to make your basket. Do not be afraid to fail and try again.

Make a cedar bark basket:

Traditionally, a length of cedar bark would be folded in half and weaved together with plant material to create a cedar bark basket. Cedar bark is collected in the spring, and great care was taken not to "girdle" the tree by removing only a small section of bark and not an entire ring around the diameter. The outside of the cedar would break, but the inside would stay together, so it would still hold items inside. Sometimes it would be folded in a way to make a circle at the bottom of the basket. We are using cardboard, which behaves a little differently. How is it a different material than cedar bark?


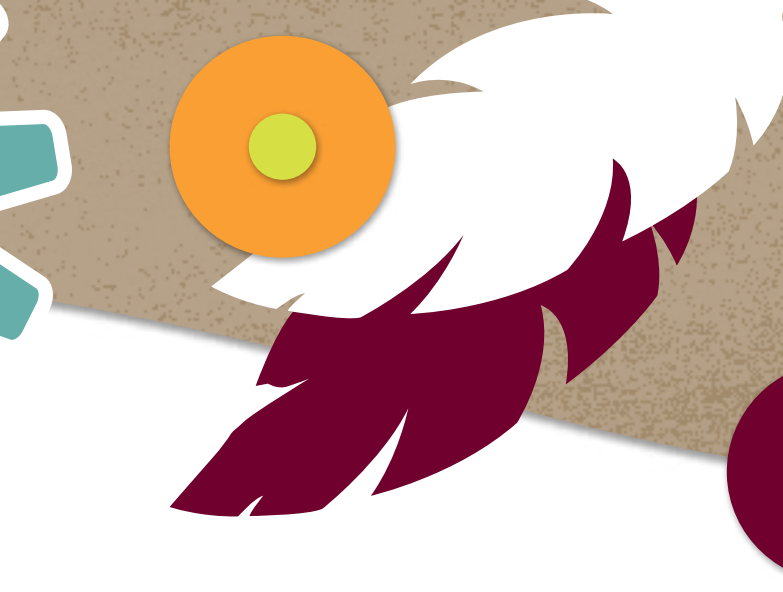
Educators should explain that we have provided the materials and would like them to make a basket on their own. They can ask for help if they need. Explain that they should start with just one cardboard piece. They'll need to weave it together to make a basket. There is no right or wrong way to lace up the basket, different lacing patterns will yield different baskets that may perform a specific function. Fold the basket into shape, line up the holes, and lace as desired.

When weaving up the sides of the basket, again talk to students about how the cardboard is different than cedar bark. Cedar bark will make small splits when you weave through it. Because of this, the holes could not be on the same line, or else the cedar bark would split. This is different than the cardboard we are using.

Salish and Kootenai Language and Culture

What animals are shown on their basket?
Turn to page 22 for information on how to download the Animal Field Guide app to learn about these animals and their cultural significance.





SciNation role model Eva Boyd shares her extensive knowledge of weaving sally bags with students and teachers.

Make a Sally Bag:

Making a sally bag is an activity that rewards patience while improving counting skills, attention to detail, and manual dexterity. **This activity is best done with a role model that understands the process of sally bag weaving.** A variety of materials were historically used to weave baskets and all were plant materials of one kind or another. In modern times, a preferred material is a mop head that can be taken apart and woven together with garden twine to make a basket. Also thick yarn is used to make color patterns (if regular yarn is used you should double it). You will occasionally need scissors and a crochet hook to make adjustments to your weaving. To finish your basket, you will need a needle and sewing thread as well as leather or some type of material to line the top edge of your basket, as well as making small loops to either wear it around your neck or attach to a belt while you are using it, thereby keeping your hands free to gather plant materials.

The mop head needs to be taken apart so the individual strands are available. Start with 5 strands and have an additional 5 ready for each student. Garden twine can be cut to twice the length of the student's arm (arms outstretched, fingertip to fingertip). When ready to use yarn for color, cut the yarn at the same length as the twine. For both the garden twine and yarn, bring the ends together and then use the looped end to start your weaving, placing a strand on either side of the mop head. A half twist will bring it tight, then weave the next strand of mop head and twist again. It will take a bit of practice to get the technique down. (Hint: tie a simple overhand knot in your very first mop strand so you know where you started.)


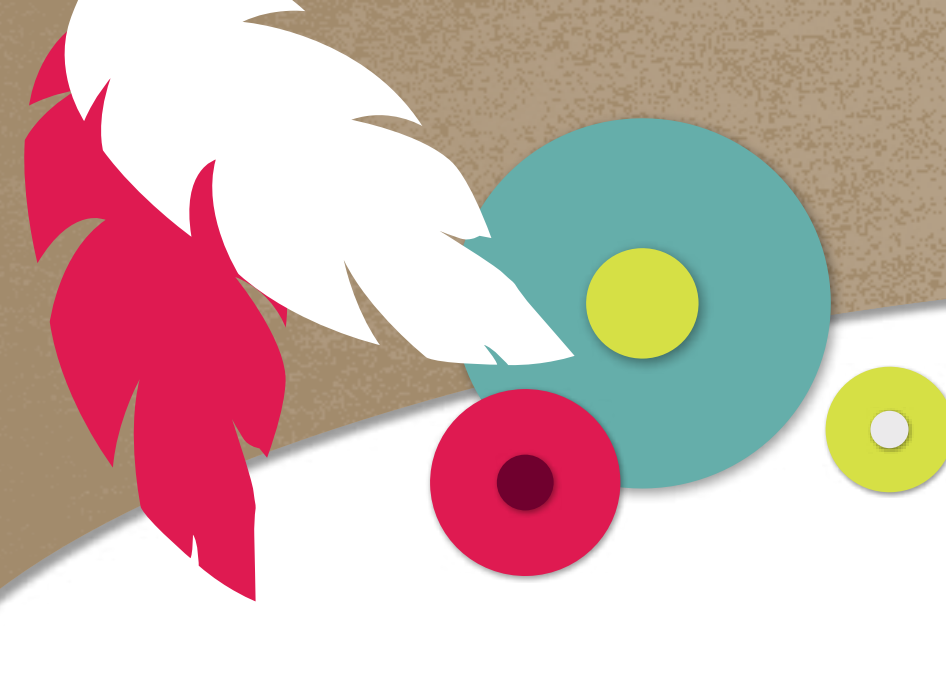
You will start with the 5 strands of mop head and weave your way around twice as described above. Then you will begin adding additional strands of mop head. First you will add a total of 5 strands, adding with each weave and twist. Once you have added 5, then go around twice more without adding. Then you will add as many as you need on this round until you go around one time. However, you will add a strand and then weave a strand and then add again (add one, "skip" one, meaning weave without adding a strand). After going all the way around in this fashion, you will then weave around 2 or 3 more times without adding strands. Then you will add strands and "skip" 2 all the way around, then weave all around about 3 times. At that point you should be ready to add yarn for color and the basket will then begin to take vertical shape.

You may not have time for kids to complete a sally Bag. It will take several class periods for students to become comfortable with the technique and make progress on a basket. For younger students (4th-6th grade) it may take two weeks of every day classroom time to complete a small basket. For older students one week of class time may be sufficient. As an after school activity consisting of perhaps 2-3 hours, a small basket could be completed in 3 or 4 sessions. Teachers may choose to continue this activity on their own time.

Explain and Expand:

Ask students to share their baskets with the class. This can be done as a whole group, or for larger classes, ask students to share their baskets with people at their tables, or a partner. Then ask for just a few people to share with the whole class. Ask questions such as:

- How did you make your basket?
 - How will you use your basket?
 - What would you do differently next time?
 - What are different types of baskets? What materials were they made with?
- 



SciNation role model Myrna DuMontier tests out a completed cedar bark basket she created to share the methods of making one to students.

As they build the cedar bark basket, educators should circulate the room and ask these questions:

- Why did you choose the dimensions that you did for your basket?
- What colors did you use and why?
- What were some of the challenges you had to overcome?
- What was your favorite part of making your basket?
- How do you plan to use your basket?
- How could you have made it differently?

As they try the weaving technique, educators should circulate the room and ask these questions:

- What happens to the shape of the basket as you add pieces of mop head?
- What happens to the shape of the basket when you stop adding pieces of mop head?
- How small or how large do you think you can make the basket?
- Where are cedar stands located on the reservation? Have you ever visited or seen them?

Evaluate:

- With the design of this basket, are there things it would work better to carry? Things it would not work well to carry?
- How are these materials different than the other materials that have been used to make baskets?

Additional Resources for Teachers

Turn to page 22 for further resources on basketmaking, including a video focusing on the relationship between basket weavers and the natural world, and the connection to the landscape and the plants utilized in weaving.

Teachers may wish to explore topics related to plants used in weaving: what kind they are where they are found, issues related to conservation and management, etc. Plants commonly used in weaving baskets include: Cedar (*Thuja* spp.), Corn husks, Beargrass (*Xerophyllum tenax*), Birch (*Betula* spp.), Willow (*Salix* spp.), bulrush, (*Schoenoplectus* spp.), rushes (*Juncus* spp.), and pine (*Pinus* spp.) needles. Students may be familiar with some of these.

It may not be practical or ecologically sound to expect to be able to go out and gather some of these plant materials to use in the classroom. **Please note that only tribal members can collect plants on the Flathead Reservation.** Every land management agency will have some type of regulations regarding harvest of plant materials under their jurisdiction. However, students can take the opportunity to learn more about the natural world and the conditions required to sustain these types of plants, and how they were and still are being used by Native peoples.

Salish and Kootenai Language: Colors and Numbers

Colors in Salish Language

- Red – k^wil
- Yellow – k^wal?
- Orange – p^um
- Green – q^weyn
- Blue – q^way
- Purple – λum – q^wayq^way
- White – piq
- Gray – čxey
- Pink – i hen
- Black – q^way
- Brown – čłk^wi

Colors in Kootenai Language

- Red – kanuhus
- Yellow – kamakçi
- Orange – kamakçi
- Green – kakaquxmaqa
- Blue – kaqłuyitqa
- Purple – kaqłuyitqa
- White – kamnuqłu
- Gray – kaçakati
- Pink – ki?kupnuhus
- Black – kamkuqukuł
- Brown – kamququkułnuhus

Numbers in Salish:

- 1 – nk^wu?
- 2 – esél
- 3 – četé
- 4 – mus
- 5 – cil
- 6 – táqn
- 7 – sispl
- 8 – hé?eñm
- 9 – xñut
- 10 – upn

Numbers in Kootenai:

- 1 – ?uki
- 2 – ?a-s
- 3 – qałsa
- 4 – xa-ça
- 5 – yi-ku
- 6 – ?inmisa
- 7 – wistała
- 8 – wuxa-ça
- 9 – qaykitwu
- 10 – ?itwu



Additional Resources

Language and Culture Apps

- Salish Qlispe Language App, available on App Store and Google Play
- Ktunaxa First Voices Language App, available on App Store and Google Play
- Animal Field Guide, Flathead Reservation, available on App Store and Google Play

Websites

- Maker Truck Home Page
<http://spectrum.umontana.edu/collaborations/SciNation/makertruck/default.php>
- Confederated Salish and Kootenai Tribes Official website. www.csktribes.org
- Salish Qlispe Culture Committee official website. www.salishaudio.org
- Montana OPI Indian Education website.
<http://opi.mt.gov/Educators/Teaching-Learning/Indian-Education>
- Selis & Qlispe Language Project: The Salish and Pend d'Oreille Comprehensive, Sequenced Language Curriculum.
www.sites.google.com/site/slaishlanguage
- Teacher Learning Hub: Indian Educational for All online courses.
<https://learninghub.mrooms.net>
- Online Instructables page for Drum Making:
<https://www.instructables.com/id/Drum-Making-With-the-Kwul-Itkin-Maker-Truck/>
- Online Instructables page for Beading:
<https://www.instructables.com/id/Beading-With-the-Kwul-Itkin-Maker-Truck/>
- Online Instructables page for Basket Making:
<https://www.instructables.com/id/Basket-Making-With-the-Kwul-Itkin-Maker-Truck/>

Videos

- Dancing Boy: Celebrations of the Salish, Kootenai and Pend d'Oreille, a short documentary by E. Patric Matt, Jr. and posted by SKC-TV about the two summer pow-wows on the Flathead Indian Reservation.
<https://www.youtube.com/watch?v=kSAOOFkLfxg>
- Salish Language Animals Video, developed by Salish Qlispe Culture Committee.
<https://www.youtube.com/watch?v=RbcZ8cEA9aw>
- Basketmaking Video Tending the Wild: Weaving Community. While his video is about basketmaking in southern California, it highlights the relationship between basket weavers and the natural world, and the connection to the landscape and the plants utilized in weaving.
www.kcet.org/shows/tending-the-wild/episodes/weaving-community-how-native-peoples-are-rediscovering-their



Visit us online to access links for additional resources
spectrum.umontana.edu/collaborations/SciNation/makertruck



Books:

Many stories have been published by the Słash Q'łispe and Kootenai Culture Committees. Recommended readings include:

- Stories from Our Elders (only to be told during winter months)
- Mathias, A. (1986) How a young brave survived. Elmo, MT: Kootenai Culture Committee.
 - The first page of this story describes the Rawhide Beat Dance, now the "Canvas Dance"

Places

- People's Center in Pablo, MT offers Traditional Arts on Friday mornings. School groups are welcome. Call **406-675-0160** for more information. <https://thepeoplescenter.org>
- North Lake County Public Library in Polson has a list of appropriate reading materials, a MakerSpace, and youth STEM programs. Call **406-883-8225** for more information. <https://northlakecountylibrary.org>

Role Models

- Meet local and native role models. Biographies of SciNation Role Models available online. www.spectrum.umt.edu/collaborations/scination



