

# STEM SUMMIT

2019 Report

## EXPANDING STEM LEARNING ACROSS THE BIG SKY



Brought to you by



Science Math  
Resource Center



With the Assistance  
of Event Sponsors



# Acknowledgments

---

## Planning Group

Laurie Bishop, Montana Afterschool Alliance  
Jennifer Brekke, School Services of Montana  
Rebekah Hammack, MSU Department of Education  
Fenqjen Luo, MSU Science Math Resource Center  
Tricia Seifert, Department head, MSU Education  
Bethany Steinken, Montana Afterschool Alliance  
Ehsan Salam, MSU Science Math Resource Center  
Suzy Taylor, MSU Science Math Resource Center and Montana Girls STEM Collaborative  
Melissa Tovaas, School Services of Montana  
Molly Ward, Mountain Goat Instructional Design

## STEM Summit Volunteers

Dan Carter, ExxonMobil / STEM Billings — Moderator  
Waded Cruzado, President, Montana State University — Welcome  
Tom Franta, School Services of Montana  
Clare Ann Harff, MAPS Media Institute — Moderator  
Emily Morril, MSU Education student  
Jessica Roth, MSU Education student  
Jessica Settlemyre, MSU Education student  
Jessica Stepleton, MSU Education student

## Special thanks to:

McCall Flynn, Education Policy Advisor to Governor Steve Bullock  
Jan Lombardi, MTAA board member emeritus  
Nico Michelletti, Senator Steve Daines's Office  
Kaitlynn Skoog, Representative Greg Gianforte's Office  
Smith Works, Senator Jon Tester's Office  
Montana University System  
Office of Public Instruction

## For more information:

**Montana Afterschool Alliance:** [networklead@mtafterschoolalliance.org](mailto:networklead@mtafterschoolalliance.org) • [www.mtafterschoolalliance.org](http://www.mtafterschoolalliance.org)  
**MSU Science Math Resource Center:** [smrc@montana.edu](mailto:smrc@montana.edu) • [www.montana.edu/smrc](http://www.montana.edu/smrc)

# Table of Contents

---

<b>Context: Overview of the 2017 Summit.....</b>	<b>4</b>
<b>STEM Summit 2019 Summary .....</b>	<b>5</b>
<b>STEM Summit 2019 Agenda .....</b>	<b>6</b>
<b>Working Groups / Unconference sessions .....</b>	<b>6-10</b>
<b>Key Take-aways.....</b>	<b>11</b>
<b>Common Themes .....</b>	<b>12-14</b>
<b>Final Thoughts and Next Steps.....</b>	<b>14-15</b>
<b>Table 1   2019 Agenda Items.....</b>	<b>6</b>
<b>Table 2   2019 Bridging Education and Industry Session.....</b>	<b>9</b>
<b>Table 3   2019 Opportunities and K-12 Science Standards Session .....</b>	<b>10</b>
<b>Table 4   2019 STEM to STEAM Session.....</b>	<b>11</b>
<b>Table 5   2019 Building a Statewide STEM Effort Session.....</b>	<b>12</b>
<b>Figure 1   Frequent responses .....</b>	<b>14</b>
<b>Figure 2   System Building .....</b>	<b>15</b>



# Context

**The 2019 STEM Summit built upon Montana's first STEM Summit**, which was held on Aug. 8, 2017 at Montana State University as a collaboration between the Montana Afterschool Alliance and MSU. The event originated when MTAA was awarded a STEM Next grant from the Charles Stewart Mott Foundation in order to promote collaborations and statewide partnerships for innovative STEM efforts.

The full-day conference, led by a professional facilitator, included:

- **A student panel** featuring middle, high school and community college students that addressed issues of access to and engagement with STEM, as well as how schools, businesses and communities support STEM for youth
- **A K-12 panel** featuring teachers, administrators and the Bozeman Education Foundation that addressed how STEM learning prepares students and what STEM skills are needed to build college and career readiness
- **A higher education panel** that addressed how higher ed can support STEM learning in the K-12 and out-of-school environments
- **An out-of-school-time panel** that discussed the roles of afterschool and summer STEM programming, as well as the connections between art and STEM
- **A business panel** focused on STEM-ready skills that employers seek

**Participants generated ideas for Montana's top priorities regarding STEM learning, prioritizing them as follows:**

- 1) Create a statewide centralized STEM effort for networking and resources
- 2) Build a bridge between K-12 STEM education/out-of-school pipeline and workforce and innovation
- 3) Increase access and affordability for after-school/out-of-school STEM programming
- 4) Transform STEM into STEAM (with art)
- 5) Focus on K-12 curriculum

MTAA, MSU, Summit attendees and other stakeholders have used these priorities to guide programming and partnerships in Montana, including setting the agenda for 2019's Summit.

# STEM Summit 2019

---

**On Aug. 8, 2019**, 165 representatives from education, industry, non-profits and other institutions gathered at Montana State University to discuss how we can better collaborate to advance STEM learning in the state. The event was scheduled strategically between the Science Summer Institute (primarily for K-12 teachers) and the Montana Afterschool Alliance annual conference. Participation in STEM Summit 2019 was free thanks to support from Blue Cross Blue Shield of Montana, Northwestern Energy, and Montana NSF EPSCoR.

## Who came?

Attendees included representatives from the following sectors:

- Community-based youth-serving organizations
- K-12 education
- School-based afterschool programs
- Montana University System
- State government
- Federal government
- Education support organizations
- Economic development
- STEM industry

## What did you do?

STEM Summit 2019 aimed to build off the foundation and conversations from the STEM Summit held in 2017 (described on p.4). As such, the schedule was designed to:

- Ground attendees in the key priorities that emerged from the STEM Summit in 2017
- Reflect on the progress that has been made since 2017
- Give attendees ample opportunity to envision the future using an ‘unconference’ format

## What’s an Unconference?

An unconference is a loosely structured conference emphasizing the informal exchange of information and ideas between participants, rather than following a conventionally structured program of events. Participants are invited to share their own reflections, experience and inquiry around a particular question, while also hearing from others.

## Why did people want to attend?

When participants registered for the STEM Summit 2019, they were asked: What needs to get done at the STEM Summit?

Most participants said they were registering for the Summit to look for new ideas and simply learn more about STEM in Montana. Specifically, attendees expressed an interest in knowing what other groups are doing so resources can be shared; and establishing a common vocabulary and concrete ways to support one another.

Other responses fell into a few broad categories, including content- and standards-based topics, such as Next Generation Science Standards; STEM skills vs. degrees; dual enrollment; the role of career counselors; and how STEM in the classroom connects to Career and Technical Education.

Many respondents expressed the desire to enhance industry connections with STEM education, including wanting data on job creation and career outlooks, and information about job shadowing.

Quite a few respondents recognized the unique needs of rural communities.

Overall, participants expressed a desire for collaboration and conversation tied to actionable goals and clear next steps.

---

*“I’d like to learn more about what groups are doing around STEM in Montana and how we can share resources to ensure more students are being served.”*

---

---

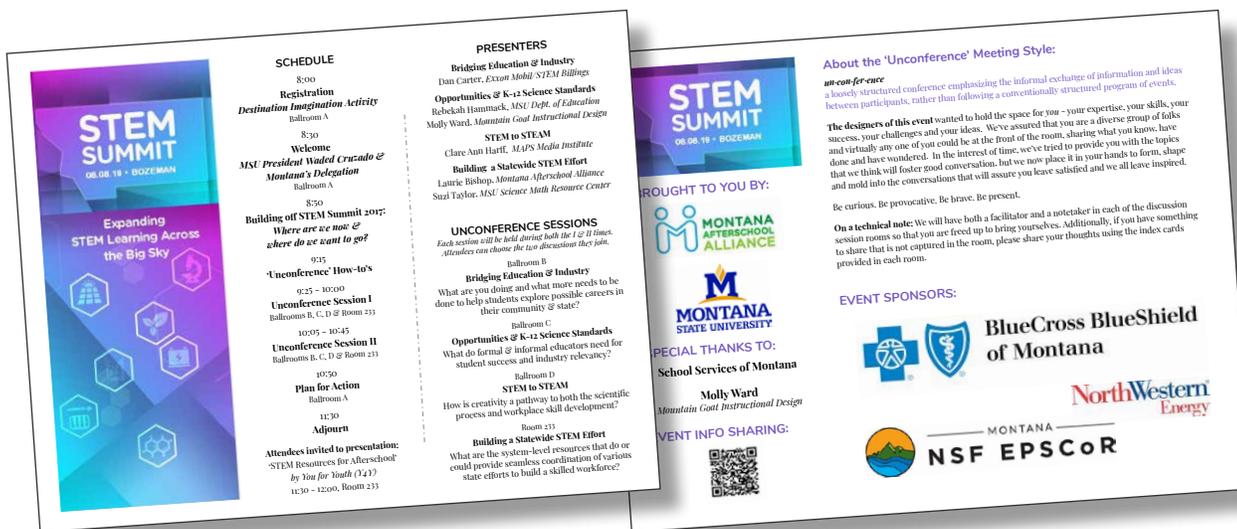
*“I purely want to see what the STEM landscape is in Montana.”*

---

---

*“I’m looking to connect with other folks working in non-formal education settings/outside the classroom, figuring out ways that we can bolster the work that’s being done within a public school setting to center STEM education.”*

---



# 2019 STEM Summit Agenda

AGENDA ITEM	SUMMARY
<b>Welcome</b>	The group was welcomed by MSU President Waded Cruzado and representatives of Montana's Delegation.
<b>Building off STEM Summit 2017: Where are we now and where do we want to go?</b>	To launch the three-hour event, attendees first heard several short success stories that tied to 2019 speakers.
<b>Unconference Sessions (Working Groups):</b>	Next, participants self-selected into one of four working groups (each participant selected two of the four topics), and discussed each topic in an "unconference" style. Moderators directed conversation while note-takers captured ideas and questions.
<b>Bridging Education and Industry</b>	In this concurrent session participants were asked "What are you doing and what more needs to be done to help students explore possible careers in their community and state?"
<b>Opportunities and K-12 Science Standards</b>	In this concurrent session participants were asked "What do formal and informal educators need for student success and industry relevancy?"
<b>STEM to STEAM</b>	In this concurrent session participants were asked "How is creativity a pathway to both the scientific process and workplace skill development?"
<b>Building a Statewide STEM Effort</b>	In this concurrent session participants were asked "What are the systems-level resources that do or could provide seamless coordination of various state efforts to build a skilled workforce?"
<b>Key Takeaways</b>	Following break-out sessions, all attendees reconvened to discuss pertinent topics and action items, and to raise additional questions. Participants filled out a final document that included top takeaways, personal action plans, and additional questions.

Table 1 | 2019 Agenda Items

## Working Groups / Unconference sessions

STEM Summit 2019 attendees broke into workgroups during two separate breakout sessions. Each session had four group options, each considering one of the four key questions. This allowed attendees to be able to sit in on and contribute to two separate discussions. Each session room had at least one facilitator and one note taker, so that the participants were free to engage fully. Additionally, many participants took

advantage of note cards available in each of the rooms. These were intended to compensate for people's comfort speaking in larger groups along with time constraints that may have prevented them from sharing all their thoughts. Reflections noted in this report were taken from both the discussion notes and the note cards, then organized based on the themes that emerged upon review.

## BRIDGING EDUCATION AND INDUSTRY

**Key question: What are you doing, and what more needs to be done to help students explore possible careers in their community and state?**

<b>Barriers</b>	<p>Kids can't see past limited job opportunities in their own communities</p> <p>Afterschool seen as babysitting instead of an opportunity to learn</p> <p>Transportation for students and resources like kits</p> <p>Can't do girls-only programs in public schools</p> <p>Industry doesn't know teacher needs; educators want to include industry but don't know how to connect</p> <p>Need more info on trade jobs</p> <p>Industry needs employees but often doesn't reach out to inform teachers of the skills that students need to obtain a job.</p> <p>Not everyone is going for a 4-year degree, and that's OK! Students are not aware of the other options</p>
<b>Ideas</b>	<p>STEM careers can be vocational, not necessarily 4-year. Connect with 2-year education and other pathways (apprenticeships, etc.)</p> <p>Emphasize the "wow" factors for new careers</p> <p>Career fairs in schools; double up with other schools in the region</p> <p>Entrepreneurial thinking – use your skills to stay local</p> <p>Videos to show kids what jobs are available</p> <p>Integration between school day and afterschool</p> <p>Skype/technology to connect with role models</p> <p>Create and maintain a Website for students to outline the information they are learning and how they are applying that to their activities and hands-on experiences</p> <p>Invite non-profits, businesses to facilitate afterschool programs that introduce their industry</p> <p>Project-based learning (PBL)</p> <p>Bring recent graduates back to speak to schools, especially if students don't have a role model at home</p> <p>School-to-Work: Students take 1-2 periods to go to a job</p> <p>Need a matchmaker service between afterschool programs and industry</p> <p>Educators want to identify companies/organizations that are willing to visit schools and share info about STEM jobs with youth</p> <p>Mobile health van</p>
<b>Resources</b>	<p>Mobile health van - (Center for American Indian Research on Health Equity - CAIRHE)  <a href="http://www.montana.edu/cairhe/">http://www.montana.edu/cairhe/</a></p> <p>Perkins funding</p> <p>School counselors</p> <p>Extension</p> <p>4-H</p>
<b>Examples</b>	<p>A school in Hamilton worked with NASA on research on carbon in the dirt, and the students were so successful that they went to Ireland and were able to learn more about what was in the dirt/environment.</p> <p>Youth in Harlem work with Northwestern Energy to learn CAD</p> <p>Montana Science Center working with Photonics industry to develop activities and share career opportunities</p> <p>Real-world challenges. Students built a bear proof container and saw which one held up best against real bears</p>

*“We have poor communities with 500 people. We see more of the children being able to see past the limited job opportunities that are available. If we help them look out for other options, maybe they won't leave, but will have other ideas and introductions”*

**Table 2** | 2019 Bridging Education and Industry Session

## OPPORTUNITIES AND K-12 SCIENCE STANDARDS

### Key question: What do formal and informal educators need for student success and industry relevancy?

*“The biggest struggle is lack of time for locating/ assessing/ implementing new activities. Activities need to cover standards that teachers are required to teach. Teachers don’t have time in the academic year to teach lessons that don’t cover standards. Identifying the standards that activities cover will help teachers save time and energy.”*

*“Resources are scattered around and in too many places. Most resources are located in Bozeman, Helena and Missoula but that is too far of a drive. A central location that is created by teachers, informal educators and industry professionals would be more efficient. More outreach events need to be done to assist rural teachers and limit travel times.”*

<b>Barriers</b>	<p>Teachers don’t have time to cull through resources; make it easy</p> <p>Industry changes so rapidly; hard for educational resources (on careers) to stay current</p> <p>Re: bridging the school day and afterschool: Students don’t want more school after the school day is over</p> <p>Hard for rural teachers to attend conferences</p> <p>Time crunch: Teacher meetings are filled with standards and timelines. Anything new has to enhance or replace, not add more to teachers’ plates.</p> <p>Informal educators are looking for training on NGSS standards or 3D learning - Crosscutting concepts and Science and Engineering Concepts and core content.</p>
<b>Ideas</b>	<p>We need that hub or a website or a place to put things, like “Teachers Pay Teachers”</p> <p>Need 30-minute activities for before/afterschool setting</p> <p>Elementary teachers can ask middle/high school teachers for activities</p> <p>Expose students to skills that are useful in Montana</p> <p>(If a database is created) Teachers can rate the resources for relevance</p> <p>Build skills that apply regardless of content (communication, teamwork etc)</p> <p>Need an easy way for informal educators to know standards</p> <p>Kits that stay within a region so less transportation, more coordination</p> <p>Regional STEM summits to identify partnerships</p> <p>Online designated chat times for professionals to answer questions</p> <p>Virtual outreach events</p> <p>Virtual academic competitions (e.g., LEGO League) for rural schools</p> <p>Teachers can look at job descriptions and use those to design activities</p> <p>Integrate formal and informal education activities. Industry can see this repository and fund STEM activities that would prepare them for future jobs. They could also see areas where their expertise is useful.</p> <p>Examples of new technologies help teachers and curriculum developers prepare for what’s next—but make this information visual and easily accessible</p> <p>Communicate to higher education (perhaps regionally?) about topic areas where teachers are short on activities/supplies</p> <p>Science centers/informal education invite teachers to be part of the design process for activities</p> <p>Can we take the trunks, tours, etc. that are already available and align them to NGSS? (Examples: Montana State Parks, Missoula Natural History Museum)</p>
<b>Resources</b>	<p>Montana Education Association-Montana Federation of Teachers</p> <p>Project Lead the Way - <a href="https://www.pltw.org/">https://www.pltw.org/</a></p> <p>National Science Teachers Association activities</p> <p><i>Connected Science Learning</i> (NSTA online journal that links school-day and out-of-school learning) <a href="http://csl.nsta.org/">http://csl.nsta.org/</a></p> <p>Office of Public Instruction is making a resource to show where subjects overlap for standards, e.g., technology, media/library arts, Career and Technical Education, etc. overlapping with science standards</p> <p>Montana Teacher Learning Hub - <a href="https://learninghub.mrooms.net/">https://learninghub.mrooms.net/</a></p> <p>500 Women Scientists - Bozeman chapter: <a href="https://bozeman500womenscientists.weebly.com/">https://bozeman500womenscientists.weebly.com/</a></p> <p>Montana Science Teachers Association website, Facebook page, e-news</p> <p>Extension + possible grant opportunities?</p> <p>MSU WISE - Women in Science and Engineering - <a href="http://www.montana.edu/wise/">http://www.montana.edu/wise/</a></p> <p>The Montana Educational Curriculum Consortium by School Services of Montana. Link the resources so they have a more intentional workforce connection. (<a href="https://www.mt-schools.org/mecc.html">https://www.mt-schools.org/mecc.html</a>)</p>

**Table 3** | 2019 Opportunities and K-12 Science Standards Session

## STEM TO STEAM

### Key question: How is creativity a pathway to both the scientific process and workplace skill development?

(STEAM is the integration of STEM and the Arts)

<b>Barriers</b>	<p>Art not included in NGSS (Next Generation Science Standards)</p> <p>Art not integrated; only taught one day per week</p> <p>Science, math and engineering can seem boring to kids</p> <p>Kids hate math</p> <p>Changing how girls think about their identity as scientists</p> <p>Kids struggle with failure; this has been pushed on them since elementary because grades depend on right and wrong</p> <p>Kids don't want to do schoolwork after school</p> <p>Montana is behind on the STEM to STEAM movement</p>
<b>Ideas</b>	<p>Teachers work together to combine art and science, art and math</p> <p>Employers report lack of communication skills. STEAM can help!</p> <p>When hiring, employers look for a diverse skill set, such as video editing</p> <p>Art can help develop a professional skill set to communicate innovation and pitch ideas and concepts successfully</p> <p>Make a contest out of learning new skills</p> <p>Physics and math of skate parks</p> <p>Include high school mentors; good for their resume but they can be intimidated</p> <p>Help kids understand it is OK to fail as long as you learn from the mistake and push through. Art does not attach to an outcome</p> <p>Make afterschool fun--not too much like schoolwork</p> <p>Bring in Native American designs, geometrics. Use creativity in cultural designs and making cultural items</p> <p>Easy to tie in Indian Education for All with art and science using natural ingredients</p> <p>Idea database that gives ways to incorporate Art (or other subjects)</p> <p>Great way to bring in student Voice</p> <p>Less lecturing, more hands-on activities</p>
<b>Resources</b>	<p>Desmos.com - website visualizes linear equations</p> <p>Montana Photonics Alliance - laser course for elem/high schools</p> <p>GirlsWhoCode.org - helps kids think about their identity as scientists and leaders</p>
<b>Examples</b>	<p>Atomic Circus Project combines Science and Theater. Includes improv, dancing, blowing things up. Eastern Montana - <a href="https://www.msubillings.edu/urelations/releases/2018/2018Apr10Circus.htm">https://www.msubillings.edu/urelations/releases/2018/2018Apr10Circus.htm</a></p> <p>Photonics partnership with Montana Science Center shows the beauty of light. Photography merges math and light. Kids can come to MSC for a photonics field trip. Kids also learn about careers in lasers/photonics.</p> <p>Helena teacher combines science and art: e.g., what are the chemical components of paint</p> <p>Bozeman afterschool educator ties contemporary and classical art with how we see the world (Fibonacci). Compares aerodynamic flow of birds to kite flying</p>

*“Art is being cut out of the NGSS. The end game is to be creative, but how can we bring the expertise to the classroom? How can teachers include creative activities in their classes instead of only one day per week?”*

*“Art is a fundamental problem-solving subject - thinking about something in your head and bringing it to life. When we remove art class, we remove that ability for kids to think and build. Art is always cross-curricular!”*

Table 4 | 2019 STEM to STEAM Session

## BUILDING A STATEWIDE STEM EFFORT

**Key question: What are the systems-level resources that do or could provide seamless coordination of various state efforts to build a skilled workforce?**

*“The resources are out there – how do we find them and hook folks up?”*

<b>Barriers</b>	<p>Lack of basic evaluation tools—how do we show our impact?          Lack of common goals          Need state-level funding – grant writing takes too much time          Need more girls in STEM classes - robotics, coding, drones          Shipping of STEM resources is expensive          Teacher shortage, including in Agricultural Education / FFA          How can we know more about what’s working in our state already?          How will we fund centralized support?          How to bring hands-on to distance learning?          Junk filters are sending important resources to junk boxes          Silos</p>
<b>Ideas</b>	<p>Include rural students in grant writing          Connect science and ag          More mobile science          Need more dedicated funding at the state level for both formal and informal education          Start kids earlier: 3rd-5th grade          Could we have a Rural Americorps? (Like Big Sky Watershed Corps)          Need STEM resources - stuff we can get at the dollar store.          Distance learning is good - Webinars PLUS follow-up          Interactive map of individuals that have expertise in a certain area and are willing to go to schools/ afterschool</p>
<b>Resources</b>	<p>AgEd/FFA teachers          Digital Academy – <a href="https://montanadigitalacademy.org/">https://montanadigitalacademy.org/</a>          Rural AmeriCorps          Montana High-tech Business Alliance – <a href="https://mthightech.org/">https://mthightech.org/</a>          Bioscience Alliance – <a href="https://www.montanabio.org/">https://www.montanabio.org/</a>          Montana Girls STEM Collaborative – <a href="http://www.ngcproject.org/montana">http://www.ngcproject.org/montana</a>          Other states have central office that coordinates needs through the education pipeline          Western Governors Association – rural connectivity is their focus this year.          spectrUM Discovery Area has mobile science van – <a href="https://spectrum.umd.edu/">https://spectrum.umd.edu/</a>          Montana NSF EPSCoR – <a href="http://mtnsfepscor.org">http://mtnsfepscor.org</a>          Montana University System          National Geographic has virtual field trips - <a href="https://www.nationalgeographic.org/education/student-experiences/explorer-classroom/">https://www.nationalgeographic.org/education/student-experiences/explorer-classroom/</a>          Extension          Office of Public Instruction website and catalog of resources          Montana Science Center          Museum of the Rockies science trunks          FabFems.org (database of women role models)          TheConnectory.org (advertise STEM events/opportunities for free)          Montana Girls STEM Collaborative newsletter – <a href="http://bit.ly/girlsstem-news">bit.ly/girlsstem-news</a>          There are already many regional or local resources that people don’t know about. Extension, state parks, Fish/Wildlife/Parks - sometimes they have a mandate to do outreach but people don’t know about it. Could develop regional hubs for STEM outreach</p>
<b>Examples</b>	<p>Wyoming has an Art Tour Vehicle that comes around the state. Nebraska has MakerMobiles that go to afterschool programs. Montana Outdoor Science School bought a van with the goal of bringing science to rural areas.          Museum of the Rockies is working with smaller museums. Piloting StarLab in the NE corner</p>

**Table 5 |** 2019 Building a Statewide STEM Effort Session



# Common Themes

---

## System-Building

A basic, but critical element of the discussions about expanding STEM learning is the need for system alignment and coordination statewide. Unlike many other states, Montana has no central state office or council whose role is to weave together the many efforts in K-12 education and out-of-school time with the resources and needs of higher education, industry and government.

STEM Summit 2019 participants identified specific tools and strategies for next steps to move us toward statewide system-building and coordination:

- Create a central hub/website for STEM stakeholders
  - ‘a place to put things’
  - Ensure resources are tagged for easy searching by standards, industry connections, grade level, etc.

- Establish communications to:
  - assure relevance for all audiences
  - avoid duplication of efforts and resources
- Engage industry at the state-level to:
  - strategically expand resources through sharing of tools, expertise and funding
  - assure activities are relevant to workforce needs

**Afterschool vs School Day** Having both formal and informal educators together brought voice to their shared needs and interests as well as some key differences. Montana reflects a national interest in bridging the school day and afterschool, and attendees agreed that much more can be done to align goals, strategies and resource use in their communities. As stakeholders address resource needs and opportunities, the unique aspects of both settings can and should be balanced and reflected.

All educators need easy access to high-quality lessons and activities that maximize hands-on learning. However, afterschool and school-day settings differ in some key ways:

- School day settings often allow for longer lesson times and more progression in concept learning.
- The same core group of students is typically together day after day, so lessons can scaffold on one another
- Lessons most likely require alignment with Next Generation Science Standards or math common core alignment, and educators seek additional training on NGSS, 3D learning, cross-cutting concepts, core content, and Science and Engineering Concepts.
- Afterschool students’ schedules are less predictable, so

---

*“Afterschool needs to be fun, especially for little kids.”*

---

---

*“We need to create space where kids’ brains can relax a bit. Find games that teach some of the soft skills.”*

---

lessons and activities that are stand-alone work best. But, afterschool can also hold space for students to experience failure in a less-structured discovery process.

- “We need micro-bursts of lesson plans that can be done in a day, maybe 20 minutes, with some reflection and play.”
- Educators also mentioned that kids experience long days at school and we risk “burn-out” if afterschool is too much like the school day.

**Rural** As we consider issues of equity and inclusion in STEM education, the specific needs of rural communities should be considered. Rural educators are often masters at utilizing community businesses, organizations and natural landscapes - their creativity and commitment deserves recognition. So, too, do the challenges they face connecting with resources of all kinds that are more readily available in more densely populated areas of the state.

Access to high-quality STEM experiences, materials and experts not only supports educators, but students as well. Rural youth are more likely to live in low-income communities with less access to out-of-school time programs and activities as well as industry role models who can help them visualize themselves in a STEM career. Additionally, even when programs are available, limited transportation is a common barrier to youth participation - very few communities offer a ‘late bus’ that supports participation in afterschool activities.

Our strategies for success should provide equitable opportunities in and out of the school day, regardless of where you live. This can mean additional financial resources



that support getting youth to other regions of the state to participate in short-term programs. It can also mean building stronger networks to connect STEM industry role models, equipment and materials to more isolated communities.

**Unique Audiences and Topics** Across the unconference breakout discussions, several unique topics and audiences emerged as deserving special consideration.

**Agriculture** While some discussions focused on the integration of STEM with the Arts to create STEAM, participants noted the absence of deliberate efforts to integrate STEM with Agriculture. Agriculture education plays an important role in helping students learn and understand the relevance of STEM skills. In a state like Montana, we need to work harder to include agriculture industries in accounts of what’s working and our visions of what’s possible.

---

*“We can use science as a pathway to encourage our students to use/build/relate to our land/reservation through Math and Art”*

---

**Indian Education for All and Native Students** Several participants noted opportunities to combine STEM/STEAM with Indian Education for All (IEFA) curricula as well as our responsibility to explore the needs of indigenous students. IEFA can provide a powerful platform for all students to expand their understanding of STEM. It can also be especially helpful for Native students to see themselves in STEM careers by validating indigenous ways of knowing and their relevance.

**Environmental Education** Participants noted that Environmental Education also includes many aspects of STEM/STEAM. Every corner of Montana is rich with opportunities to engage students with their natural landscape. And environmental education can be a pathway toward the non-technical skills desired by employers, such as teamwork, communication and problem-solving.

**Special Education** While our time constraints limited time for discussion, STEM accessibility in Special

Education deserves further exploration. This discussion can include considerations of curricula as well as inclusion in activities and experiences outside of school.

**Girls in STEM** Participants recognized the challenges of engaging girls in STEM and showcasing diversity in STEM, noting that—in general—STEM classes and clubs like coding, drones and robotics are predominantly filled by boys. It can be challenging or even against policies to host girls-only programs within a public school or organizational setting. While we see progress in expanding programs and gatherings that allow girls to learn more about STEM and their own interests, we still need more guidance, opportunities and statewide coordination.

**Career Skills and Workforce**

**Development** As noted on p. 9, participants overwhelmingly support better connections between industry and education.

Educators also recognized several important strategies that can be implemented within a classroom or afterschool program, including

- Learning more about various careers, especially those available locally and in the state, in order to share the “wow” factor with kids
- Reminding youth that STEM can be vocational and encouraging youth to explore all educational and career pathways, not just a four-year degree (e.g., two-year programs, trade schools, internships, job shadowing, apprenticeships, etc.)
- Asking parents, neighbors, recent graduates to share their career paths with youth
- Better aligning resources for career development with student learning and standards

---

*“I hope children are more aware of their possibilities and potential outcomes, even if those “career” possibilities don’t exist currently. We need to listen more to students, invite them to explore, dream and discover; empower them to do what they dream.”*

---

## Post-Summit Actions (as of February 2020):

The collective understanding and collaboration of the Summit positioned the partners to capitalize on multiple opportunities that are currently in motion.

- **Small Town STEM:** This partnership between Montana Afterschool Alliance and Montana NSF EPSCoR's outreach leads—MSU Science Math Resource Center and spectrUM Discovery Area—offers targeted strategies and supports to communities with a population of less than 2,500. MTAA is providing direct coaching and support and aligning materials and curricula to areas of grant focus. Several educators have received financial support for STEM professional development.
- **State Resource Directory:** MTAA is working with various Summit attendees and others to share experts, experiences and materials available in the state to support high quality STEM learning and exposure. The project goals include a published directory and developed strategies to connect resources in under-served areas. This project is funded by STEMNext.
- **Policy Development:** Through the support of an Afterschool Alliance STEM Capacity Building Grant, MTAA is conducting a series of conversations and gatherings with stakeholders to identify shared policy goals for future statewide system building.
- **Mizzen App:** A handful of Montana afterschool programs are piloting the Mizzen App. The app, which is slated to launch nationwide in spring of 2020, will have over 1,000 pieces of content, including STEM lesson plans and activities, searchable by age group and topic.
- **Montana Girls STEM Collaborative:** The Collaborative, which was launched in 2012 as an outreach program of Montana NSF EPSCoR, is again supported under the current Track 1 proposal. A Fall 2019 partnership. A Fall 2019 partnership with MTAA helped the Collaborative bring the Girls Have No Limits program to Montana rural communities. The program, supported by Mattel and Mercedes Benz, uses Matchbox cars to dispel gender stereotypes in toys.
- **Million Girls Moonshot Grant:** MTAA is applying for a grant to support the development of guidance and professional development specifically focused on helping under-represented populations develop an engineering mindset.
- **Montana Sci-Tech Summit:** School Services of Montana (SSoM), in collaboration with the MSU Science Math Resource Center (SMRC), is offering the annual Sci-Tech Summit for educators in August 2020, a three-day institute focused on STEAM strategies and resources for K-12 classrooms.
- **Montana Education Curriculum Consortium (MECC) Integrated Approaches:** Under SSoM's coordination, MECC is continuing to integrate STEM career/industry connections in their science curriculum frameworks for school districts across the state.
- **STEM Yellowstone:** STEM Billings has transformed into STEM Yellowstone (reaching all of Yellowstone County). This collaboration of business, education and nonprofit partners hosts STEM-related youth events on Saturdays a few times throughout the year. Their work has progressed to the point where the model could be replicated in any Montana community! Their main suggestion? DO NOT make this “school on Saturday.” Design it for relevant and interesting hands-on activities.

## Final Thoughts and Next Steps

While both the 2017 and 2019 drew a diversity of participants, educators were heavily represented due to scheduling the Summit to dovetail with meetings of out-of-school and school-day educators. Follow-up conversations with government, industry and economic and workforce development organizations are needed. The committee suggests future convenings to take a deeper dive around our needs to build the statewide STEM focus and resources.

And while STEM Summit participants shared a strong interest in collaboration and centralized support, more investigation is needed into whether that can be furthered with a technical solution such as a repository or database for lesson plans and other STEM-related resources, or a human solution that facilitates connections and communication. The

solution is likely a combination of the two, and deserves more research, especially into how we can better identify the gaps in Montana and take advantage of existing resources in order to avoid duplication.

Montanans are passionate about the role of STEM/STEAM in all aspects of youth education and recognize its influence over future career pathways. People also recognize the strength in collaborating across sectors, even if they don't know exactly how to proceed. And though collaboration is not always easy, and moving the needle on STEM education more difficult still, we can strategize ways to celebrate little wins along the way while moving toward big wins to celebrate at STEM Summit 2021.

# SYSTEM BUILDING

How we can come together to build systems

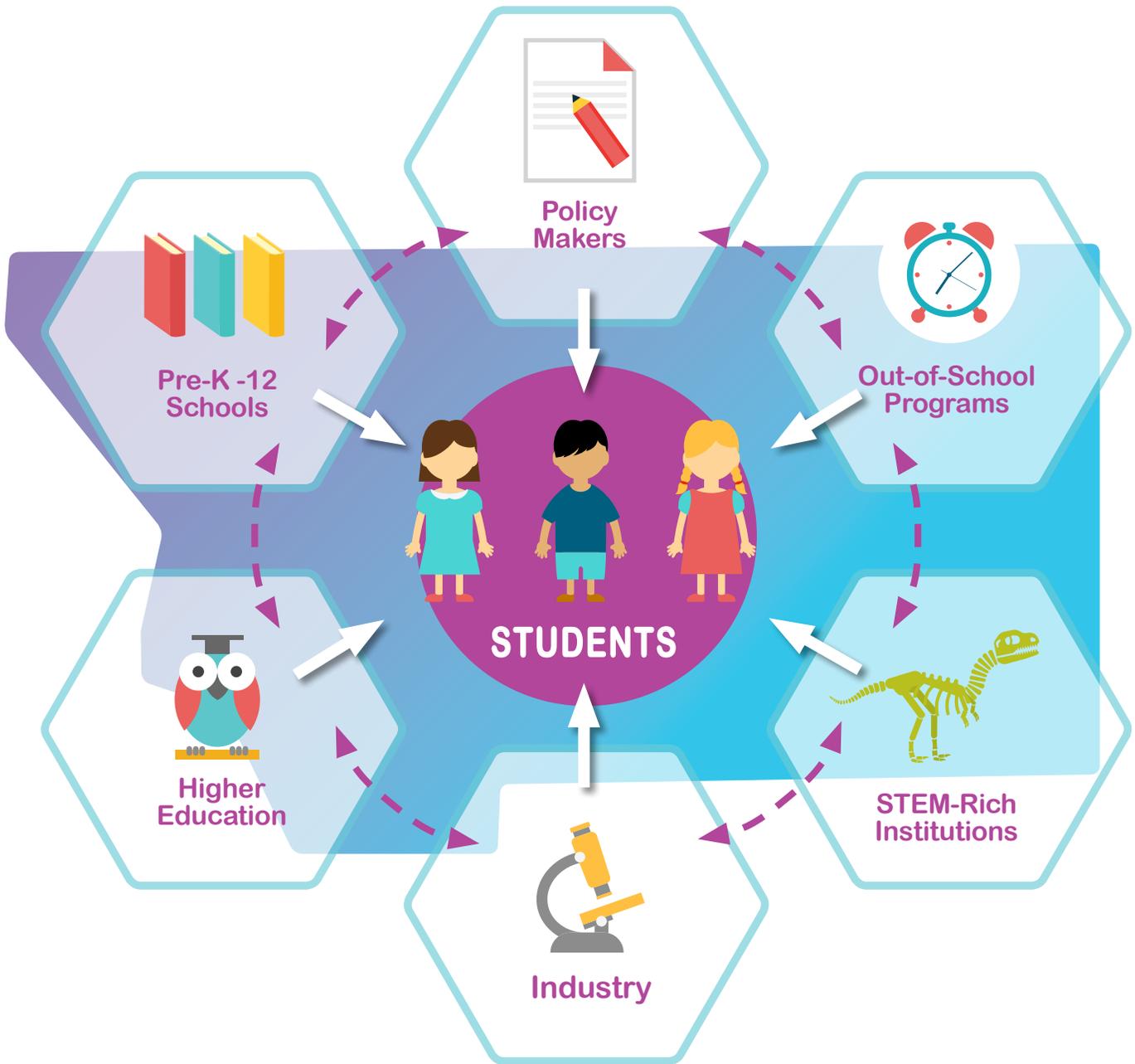


Figure 2 | System Building



March, 2020

Montana State University Science Math Resource Center  
and Montana Afterschool Alliance