

Rural Community STEM Engagement Grant & Making Spaces Expansion Case Study: July 2019

Project Overview

In May of 2018, the Idaho STEM Action Center (STEM AC) awarded four organizations, all libraries, the Rural Community STEM Engagement Grant, a pilot project to build momentum for STEM education in small, rural communities. Each grant recipient was tasked with recruiting educators from local schools and youth-serving organizations to attend a two-day professional development workshop, hosted locally, but developed and facilitated by STEM AC. The objectives of this workshop were three-fold: i) to introduce local educators to the methods, philosophies and motivations of maker-centered learning and its connection to STEM; ii) to build confidence and skills necessary for planning, facilitating, evaluating and sharing maker-centered learning activities; and iii) to build a community of local educators invested in developing quality STEM learning opportunities for youth. Grant applicants were required to demonstrate pre-existing momentum around STEM and/or making education in their community and to submit letters of support from partner organizations committing staff to attend the workshop and facilitate a making project at their site. Each lead organization received \$10,000 in funding, \$1,500 of which was earmarked for workshop logistics (catering, advertisement, etc.), \$3,500 to strengthen and develop STEM programming at their site, and five mini-grants of \$1,000 each to distribute to partner organizations to implement making projects.

Recipients of this grant included: Valley of the Tetons Library in Driggs, ID; Payette Public Library in Payette, ID; Glenns Ferry Public Library in Glenns Ferry, ID; and McCall Public Library in McCall, ID.

Following the successful implementation of the workshops and while partner projects were still being implemented, STEM AC reached out to each of the lead organizations with the opportunity to join an expansion project called Making Spaces, a Research Practice Partnership led by the Maker Education Initiative and Children's Museum of Pittsburgh. Each library would have to identify a classroom teacher, who had attended the workshop and who demonstrated a strong interest in partnering with the library on maker-centered learning projects. Each library-school pair would then receive further professional development, funding and individualized support to implement a collaborative multi-session educational project with the teacher's students and then organize a community event showcasing the results. Three of the four libraries accepted the expansion opportunity and recruited teacher partners in November-December 2018. McCall Public Library passed the opportunity to a regional partner - the Cascade Cultural Arts Center,

whose representatives had attended the two-day workshop. A description of the grant activities and impact at each site follows below:

Valley of the Tetons Library (Driggs, ID)

Valley of the Tetons (VoT) Library is the sole library system for Teton County, a county of about 10,000 residents in southeast Idaho which acts, in part, as a bedroom community for the nearby resort area of Jackson Hole, WY. The median income for a family in the county at the 2010 census was \$56,791, which is above the state median. Approximately 38% of students in the Teton School District receive free or reduced lunch. While poverty is lower than elsewhere in the state, the geographic isolation of Teton Valley -- particularly in winter, when road closures can often affect all routes in or out of the county -- limits access to educational opportunities for youth, as well as professional development opportunities for educators. Teton County has a significant Hispanic/Latino population of 17% who are disproportionately impacted by poverty, with a poverty rate of approximately 15%, compared to 8.25% overall.

The main branch of VoT Library is located in Victor, the county's largest city; however, in 2014, the Library was able to open a new branch in nearby Driggs, pop. 1660, the county seat. The Driggs branch created new opportunities for library programs as well as collaboration with the Teton School District, which is headquartered in Driggs. As VoT Library sought to diversify and expand its staff, they hired Tucker Tyler, who had been facilitating exploratory STEM programming as a regular volunteer, to be the new "Makerspace Librarian." Tucker applied for the Rural STEM grant and in August 2018, a community STEM workshop at the Driggs Community Center was attended by 16 educators, including elementary and high school teachers, library staff, 4H program leaders and staff from the Teton Arts Council. The workshop kick-started a number of new organizational partnerships and catalyzed the Library's decision to transform a storeroom in the Driggs branch into a permanent makerspace. The makerspace sometimes sees up to 40 kids a day, most between the ages of 7 and 12, and has been featured in local and regional press.

One of the educators in attendance at the August 2018 workshop was Jen Ozburn, a fifth grade teacher at Rendezvous Upper Elementary School. Students in Teton County attend lower (K-3) elementary schools in the town where they reside; however, all fourth and fifth grade students enroll at Rendezvous, which is located in Driggs. During the workshop, Jen and her colleagues developed a maker-centered lesson plan for their solar systems unit, and returned to the school to create a "Maker Team" of teachers working to bring cross-curricular making projects to Rendezvous. During the Making Spaces expansion project, Jen worked with Tucker to explore further opportunities for formalized partnership between

the Library and the School, and to explore how the Library's new makerspace could be used to supplement classroom learning.

For their collaborative making project, VoT Library and Rendezvous put together a community event called "Maker Rendezvous," hosted at the school. The event featured classroom-specific stations including robots, 3D pens and electronics take-apart, as well as a science fair-type display area where students could display individual and group work. In the weeks leading up to the event, VoT Library provided two in-class outreaches for each 4th and 5th grade class, organized field trips to local maker's workshops and hosted field trips to the Driggs branch of the public library for students to learn about makerspace resources and create projects for the big event. A total of 250 students had the opportunity to participate in the project, with 400 people attending the community event.

Progress made during the Rural STEM and Making Spaces expansion projects has enabled a **strong, sustainable partnership** to develop between the library and upper elementary school. The collaboration with Rendezvous proved to be a huge boost for makerspace participation at the library, both in terms of numbers as well as the quality of participation. More than half of the fourth and fifth grade students from Rendezvous have visited the makerspace on their own time since the collaborative project began. Additionally, the teachers and administration at Rendezvous have been so encouraged by the students' enthusiasm for maker-centered learning that they have decided to dedicate an entire classroom as a makerspace at the school next year. The Library and Rendezvous intend to continue their partnership as both spaces develop.

McCall Public Library & Cascade Cultural Arts Center (Cascade, ID)

Cascade is a rural city with a population of just 622 in 2017. It is the seat of Valley County, which is also home to the larger resort town of McCall. The median household income in Cascade is \$43,047 and 40.2% of students in the Cascade School District receive free or reduced lunch. Cascade's population is both shrinking and aging. The elementary and junior-senior high school share the same campus and have a total enrollment of 260 students. Students in the Cascade School District have smaller class sizes and more individualized attention than many public schools, but also limited district resources and academic or extracurricular opportunities.

Cascade Cultural Arts Center (CAC) is a committee formed under a community action group - Horizon's Lifestyle and Education Team. They offer a variety of cultural amenities for the community including space for local artists to display work or host classes, art and music lessons, after-school programming and special events. CAC was one of five partner organizations who attended the McCall-based Community STEAM workshop in September

2018, hosted by the McCall Public Library. The organizers of the McCall workshop had wanted the training to activate not just their own community, but the surrounding communities as well. Participants in the workshop included two members of the CAC as well as the incoming director of the public library in the nearby town of Donnelly (pop. 134).

Since the workshop, McCall Public Library has served as its own sort of regional hub, sharing resources to benefit Donnelly Library's new maker program and facilitating a follow-up professional development workshop with the U of I Extension Office in April 2019. The workshop was attended by 10 people, the majority of them new educators who had not attended the previous training. Meanwhile, a member of CAC appeared before the board of the Cascade Public Library to advocate for the creation of a library maker program, and pointed to McCall as an example they should follow. The three community leaders (McCall Library, Donnelly Library and CAC) have begun to collaborate and communicate with one another more, serving not only to connect their respective programs, but to unite educators across the valley in common cause.

When McCall Public Library was approached with the Making Spaces grant opportunity, they were just beginning the process of designing an entirely new library building (where they intend to install a permanent makerspace) and were unable to take on the project. However, they recognized an opportunity to elevate another making leader in the region, and recommended STEM AC offer the grant to CAC. CAC accepted, and approached third grade teacher Rachel Sievers. CAC had previously used subgrant funding from the Rural STEM project to fund a small makerspace in Rachel's classroom and complete a project with her students. They now had the opportunity to bring further financial resources into the community and to continue to promote the Center as a making hub and key collaborator with the school.

Together, Cascade Cultural Arts Center and Cascade Elementary engaged third grade students and Cascade community members in bringing "Fish on Fences" to Cascade. "Fish on Fences" is a project started by the Stream of Dreams Mural Society, a non-profit organization based in BC, Canada. The project engages communities in installing three-dimensional murals of local watersheds on fences in public places, often schools. For their collaborative making project, Rachel's third grade students first learned about watersheds, including what they are, how water within them moves and how they sustain both people and wildlife. They learned about their local water ecosystem, taking a field trip to the Boise Watershed and discussing what it means to be stewards of a watershed. The third graders then had the opportunity to work with mentors from the high school shop class to engineer and design wooden animals for the murals. The students also worked with the school

drama/art teacher to create watershed models and prepare presentations about their displays.

CAC organized a community event for students, their families and the general public to paint the wooden fish, elk and foxes and install them on the school fence. The animals were installed against a vinyl tape background of mountains, rivers and land created by CAC volunteers. Students also had the opportunity to present their individual projects to the public during the event. A total of 17 students, including the third grade class and wood shop mentors, participated in the project, and 80 people attended the community event.

The project both **strengthened CAC's relationship** with teachers, and **built a bridge** between the broader Cascade arts community and the school, setting a precedent for intergenerational resource and skill-sharing. What is more, the project created an opportunity for partnership and peer-to-peer mentorship within the school system by engaging third grade and high school students together in an important community project. The collaboration has helped to further solidify CAC as "**the maker center of the community,**" and they are hoping to capitalize on the momentum created by the Fish on Fences project to engage more teachers next year.

Payette Public Library (Payette, ID)

Payette is a city in southwest Idaho with a population of 7,366 people. It is culturally and economically linked with the neighboring city of Ontario, OR (the two cities share a micropolitan statistical area and a Boys & Girls Club). The city has a poverty rate of 17.3% and around 70% of students in the Payette School District receive free or reduced lunch. The city has a significant Hispanic/Latino population of 21.9% and 19.1% of the overall population are native Spanish speakers.

Payette Public Library has thrived over the past few years under the leadership of Director Clay Ritter, who held previous jobs in rural libraries in Shoshone and Richfield, ID and has attended three years of "Make It at the Library" trainings organized by the Idaho Commission for Libraries. Prior to the implementation of the Rural STEM grant, however, maker education in Payette was largely a one-man show. The Library offered weekly Maker Monday programs for elementary school-aged children, attended by kids in the Payette After-School Program, but always facilitated by Clay. Engagement with middle and high school students was low. Clay was passionate about creating making opportunities for kids, but lacked formal partnerships with other educational providers and was seeking an "in" with the public school system.

With the Rural STEM grant, Clay secured a partnership directly with the Payette School District. The District not only backed the project, but arranged for a number of teachers at elementary, middle and high school level to attend the PD; and the superintendent herself attended both days of the workshop. Also in attendance were staff from the 21st Century Learning Center kindergarten and after-school programs, the Boys & Girls Club of Western Treasure Valley, University of Idaho extension office (4H) and the education outreach coordinator at Idaho Power. The workshop inspired a series of making activities around Payette, culminating in a “Lights On After-School” event in November 2018, which invited families to seven different out-of-school program locations around town to complete hands-on activities (most of which were STEM-themed).

Middle school teacher John Graverson attended the September 2018 Rural STEM workshop and was inspired to create a mini makerspace in his seventh grade classroom. He quickly emerged as a passionate advocate for maker-centered learning at the middle school level. When the Making Spaces opportunity came to light, Clay recognized an opportunity to ignite interest in making for older youth. He approached John and the two began brainstorming a possible project that could expose more middle school students to the great makerspace resources Payette Public Library had to offer.

Clay and John created a physics design challenge to complement John’s seventh grade science unit on force and Newton’s laws. The students were challenged with designing a safety system to keep an egg inside a rolling cart, without directly restraining the egg. The students experimented with designing bumpers and safety devices that would keep the egg in the seat, without creating drag. Seventh grade students took two field trips to the library, once for research and the second to test their devices. During the research trip, Clay curated a collection of relevant books to loan to the school to assist students with their projects. Test Day was open to the public and served as a community showcase for the event, which the Library also promoted on social media and in the local paper. The Payette School Superintendent was also in attendance. During the showcase, a force gauge was used to test how much force was reduced for each device. An engineer from a local firm, Heco Engineers, provided notes on student designs and then had a conversation with the class about what being an engineer was like and what he did at his job. John was so passionate about the project, he built the testing ramps at home on his own time. He also managed to find time in his curriculum to engage his sixth and eighth grade students in the project, though they did not get to attend the field trips. This brought the total number of students participating in the project to 120.

The collaborative project was an important step in developing **leadership and legitimacy** for maker-centered learning in Payette. Clay reported that other library staff have taken a stronger interest in STEM learning after seeing the connection between the research

students were conducting using traditional library resources and their final projects. The superintendent's consistent involvement at the STEM workshop and crash test event demonstrates how **the school administration is moving to embrace maker-centered learning**. The School District Office has already reached out to Payette Public Library regarding continuing and expanding the collaboration next school year. John and Clay are currently discussing the possibility of creating both a fall and a spring project and bringing in more teachers across the curriculum. They also hope to build in more visits to the library for research and delve deeper into teaching the practice of research. The Boys and Girls Club of Western Treasure Valley has also expressed interest in a similar collaboration with the library.

Glenns Ferry Public Library and Glenns Ferry High School (Glenns Ferry, ID)

Glenns Ferry is a small town in central Idaho with a population of 1,177. At 26.1%, Glenns Ferry has the highest poverty rate of any of the communities engaged in the Making Spaces project. The median household income in Glenns Ferry is \$28,967 and 73.7% of students in the Glenns Ferry School District receive free or reduced lunch.

Like many libraries in rural communities of this size, Glenns Ferry Public Library has a small staff and a part-time director. The small local school district faces financial challenges and limitations in the courses they can offer to their students. Student career and higher education aspirations are limited as well. For several years however, Library Director Jenn Trail and local middle school teacher Liza Martin have capitalized on the intimate nature of their community through Family STEAM nights and summer programs that have begun to normalize terminology such as "STEM" and "makerspace," and have demystified technologies like 3D printing and drones. The duo applied for the Rural STEM grant and brought together a cohort of 14 community educators for a two-day STEM workshop in November 2018. The organizers had planned on having a higher attendance; however, at the last minute, the school announced that it was sending a cohort of teachers to an out-of-town professional development event the same week and that substitutes could not be spared; as a result, only Liza and two other teachers from the district were able to attend. Other organizations in attendance included Three Islands State Park, Elmore County Recreation District, Community Arts Council and 4H, as well as the public library director and school librarian from the neighboring town of Gooding.

The workshop provided knowledge and confidence for educators in attendance that enabled them to attempt STEM programs on their own and collaborate more with one another. It also provided a valuable opportunity for participants to discuss their community's unique challenges (competing priorities at the school district, limited access to technology, the recent dissolution of the town newspaper) and possible solutions. When

the Making Spaces opportunity arose, Jenn and Liza saw an opportunity to create another advocate within the school district. Jenn reached out to Cara Them, a high school math teacher who had attended the November workshop. For both partners, this was a step outside their comfort zones: Jenn was collaborating with a new partner and serving youth who were older than those she typically worked with. Cara was a first year teacher and the high school's only math instructor; she taught what she believed to be the least popular subject in the school and questioned her ability to create a successful making project that would be palatable to both the district and her disengaged students. Their goal became to find a way to use making to make math more meaningful for Cara's 10th grade geometry class.

Tasked with the challenge of "making math fun," Cara and Jenn developed a 3D printing project for Cara's geometry students. The goals of the project were to develop students' abilities to visualize in three dimensions, to introduce 3D design and to promote the library's locally available 3D printing resources. During the project, Jenn conducted weekly outreach visits to the high school to work with the students on Tinkercad and 3D design. The students began with an introductory project of creating a custom ruler, and then were challenged to design and model amusement park rides. The class also took a field trip to the library, where they built K'nex sets that tied into the models they were creating. The final models will be printed and displayed at the Library's upcoming Open House following the remodel currently underway. A total of 24 students participated in the project.

The Rural STEM and Making Spaces projects have created a **new, lasting partnership** for the Glenns Ferry community between the library and a high school teacher, and created another ally as the library works to bring more maker-centered learning opportunities to the town. The project made a strong impression on both Cara and Jenn in its ability to engage those students who rarely show any interest in class, something that students' parents observed and commented on as well. This has inspired a new direction in Cara's thinking on how to engage disinterested students and bodes well for generating parent buy-in around maker-centered learning, which Cara sees as one of the major challenges for getting the district as a whole on board.

Moving forward, both partners see a challenge with integrating non-traditional learning in a very traditional community. However, Cara has already been approached by a junior high math and high school english teacher about the possibility of doing similar projects in their own classes. Thus, while moving in a non-traditional direction may continue to pose a challenge, individual teachers are becoming more interested, and this presents an opportunity for the two sites in the upcoming school year. The Library will continue to collaborate with teacher and organizational partners to create new models for learner engagement inside and outside the classroom.

Idaho STEM Action Center: Outputs, Outcomes, Next Steps

At the outset of the Rural Community STEM Engagement project, we asked ourselves what could happen if we invested a great deal of resources and mentorship in communities to start, and then gradually transitioned to a more hands-off role, where lead organizations were supporting and sustaining making movements in their communities on their own. Over the past two years, we have seen our sites and communities rise to this challenge. Our library and community partners have seen a change not only in how their communities view them, but how they view themselves, developing the confidence and skills to lead their own, localized professional development programs, redistributing funding to educational partners and supporting their local school districts to bring maker-centered learning and STEM education into the classroom. They are actively seeking partnerships with teachers and educational organizations, and their ability to connect these partners with both information and financial resources through STEM AC has helped them develop the **local legitimacy** necessary to make meaningful change. Through the work collectively done by these sites, we are reaching and impacting over 100 educators who in turn engage with thousands of Idaho students.

This year, as Idaho STEM Action Center continues its critical work with a 25% reduction in budget, creating self-sustaining STEM leaders across the state has become more important than ever. We have seen great success in this objective through Rural STEM and Making Spaces and will continue to invest resources in setting up more communities on this trajectory. We are looking forward to recruiting a new cohort of communities for Rural STEM in January 2020, and to refining the resources curated and created during the project so that more individuals who have received STEM AC-sponsored trainings can in turn train others. This project has reinforced the idea that professional development that not only teaches educators skills, but engages educators as stewards of and advocates for maker education in their own communities is critical for the **sustainability and growth of the maker movement in our state**. It has also proven an effective strategy for the achievement of STEM AC objectives of innovation and equity in STEM education. We have learned much about our small, rural communities, their challenges and their strengths through this process and will diligently apply this knowledge in the years to come.