

Full STEAM Ahead! Bringing Life to Learning

Exploration is the foundation of learning. Our **Full STEAM Ahead** mobile makerspace is designed to inspire creativity and build problem-solving skills in individuals of all ages. Focused on the integration of Science, Technology, Engineering, Arts, and Math (STEAM) and the use of found/recycled objects, our mobile learning space will bring life to learning.



Statement of Need: For the past 5-years, the Sitka School District has conducted an annual assessment of teacher proficiency in the International Society for Technology in Education’s (ISTE) Standards for Teachers. Each year at least 90% of our teachers are at least proficient in each of the ISTE Standards; however, over the past 5-years, teacher proficiency has not increased and ranges from 90-92% for the various standards. Teachers are continuing to use the educational technology with students in meaningful ways; however, they are primarily using technology as a replacement to traditional teaching tools (e.g., electronic whiteboard for a whiteboard) rather than leveraging the opportunities afforded by access to the technology to restructure the nature of learning and teaching in their classroom. In examining the ISTE standards, it is in the last 10% that the major shift happens where teachers move from a teacher-centered instructional model to a student-centered inquiry-based pedagogy. It is our belief that the key to helping teachers shift rests in helping teachers explore low-tech and no-tech ways to build a focus on student inquiry, and then bring in the technology to enhance collaboration and communication around the academic content.

I. Who We Are

We are the Sitka School District in Sitka, Alaska. As a public school district, we serve approximately 1,300 students in grades PK-12, which includes a homeschool program. We are funded through a combination of local, state, and federal revenue sources. Additionally, we are a successful grantee for a number of state and federal grants, as well as are associated with foundation grants to support or initiatives.

Students are valued in the Sitka School district. Our Vision, *educating our children to realize their potential and contribute in a connected global society*, is a guiding force in our work. Our Mission is as follows: Foster each child’s maximum growth in academics, social-emotional and physical wellbeing. Prepare children for their chosen careers, and inspire them to become active, informed community members by providing:

- relevant, innovative, and engaging learning opportunities;
- clear goals and high expectations;
- opportunities for collaboration among students, parents, staff, and community using an active outreach to stakeholders; and,
- a culture of respect for self and others, and no tolerance for bullying.

Our **Full STEAM Ahead** mobile makerspace is designed to engage students in learning that is aligned with our Vision and Mission. Makerspaces can be any space where people gather to create, invent, and learn. At Sitka High School students use computers and tools in our Fabrication and Design Lab (Fab Lab), which is an elaborate makerspace. Specifically, the Fab Lab has a 3D printer and a series of CNC router equipment; all of which helps students fabricate tools and resources needed for various projects. Students who take the Fab Lab classes tend to be both males and females, and also tend to be a blend of college-bound students, as well as students who want to enter a career immediately after high school graduation. In addition to our Fab Lab, Sitka High School has a robotics class where students participated in regional and statewide

contests for the first time last year and placed at both levels. Various and scattered teachers throughout the other schools offer makerspace learning for their students (e.g., 2nd grade Maker Math). Other resources in the district include our superintendent who holds a doctorate in Educational Technology, and two architecture students from Yale living in Sitka will facilitate the design of the mobile makerspace.

2. Our Proposal

We propose to build a mobile makerspace that will travel between the Sitka School District schools and homeschool program, allowing students at all schools the opportunity to learn within an environment dedicated to developing tinkering skills through a collaborative, creative, problem-solving approach. In addition to creating a space for students to create throughout their school career, the mobile makerspace will also develop skills that will prepare students to take full advantage of the high school's Fab Lab and robotics programs while providing students at our alternative high school an opportunity to explore learning through a similar innovative, STEAM-focused, problem-solving learning mindset.

For the first year or two of our **Full STEAM Ahead** project, we will focus on using a makerspace mobile cart that can be moved between schools by the Maintenance Department. Eventually we plan to develop a need for a refurbished bus that can be parked at a school to create a space outside of a classroom for makerspace activities, as makerspace activities often require space that is not available in a traditional classroom environment. We want our bus makerspace design to be based on knowledge of teacher use of the makerspace resources. By starting with a mobile cart teachers can sign up to use with students in their classroom, we can gather data to build a makerspace that will hold a classroom of innovative thinkers.

Goal: Teachers will design classroom activities that integrate STEAM concepts.

Objectives:

1. At least 20% of teachers in the Sitka School District will have student work included in the Spring 2017 Sitka School District's Maker Faire.
2. At least 95% of teachers in the Sitka School District will be at least proficient on the International Society for Technology in Education's (ISTE) Standards for Teachers by June 2017.

The **Full STEAM Ahead** mobile makerspace resource will be scheduled for blocks of time at each school to provide equitable access to the resource. Principals will be responsible for establishing school-based procedures for teachers to sign-up to use the mobile makerspace cart with their students. We will not have a need to provide additional staffing during the initial phase where we only have the makerspace mobile cart. All teachers will participate in introductory professional development regarding the use of the resource. Additional advanced training will be offered to teachers who are interested. The use of the makerspace mobile cart will not be a requirement for all teachers, but rather an opportunity for teachers to have ready access to resources that support the development of thinking skills that foster innovation, collaboration, creativity, and problem-solving within a STEAM construct.

Once we move to the refurbished bus mobile makerspace, we will need to have an AmeriCorps or similar staffing to ensure that the bus is arranged to meet the needs of the teachers who will be using the space (e.g., perhaps moveable blocks will serve as student workspace and one teacher may need to have the moveable blocks separated for individual team work while another teacher would need to have the moveable blocks all joined together for more of a group-focused project). During the summer months the Sitka Fine Arts Camp, a non-profit local partner with the Sitka School District, will use the mobile makerspace resource with students at their camp. They will provide a teacher and staffing needed to ensure the mobile makerspace resource is used and restocked as needed.

Our own research in the Sitka School Districts shows that students who miss less than 20 days of school (an average of 5 days a school year) between their kindergarten and 3rd grade year are more likely to gain the academic skills needed to be considered proficient on the state-mandated assessment. This is true for students from all academic abilities and economic statuses. Attendance matters. We need to do everything in our power to ensure that students attend school every day, and while here are engaged in learning activities that support the Mission of the Sitka School District, which will prepare them to be successful in their life after high school graduation. Individually and collectively, student health will benefit from active involvement in school. Individual skill in applying problem solving and creativity to enhance understanding of Science, Technology, Engineering, Arts, and Math will be crucial to develop healthy, productive adults.

The use of the mobile makerspace will be optional, so there is no way to say at this point exactly how many students will benefit from this resource. However, when we had our last optional initiative we expected a 3-year implementation timeline to get to 100% and we reached our goal within 9-months. Once teachers in the Sitka School District see how much students down the hall love using the mobile makerspace, we suspect that use will grow exponentially. For example, we have a 2nd grade teacher who using makerspace methodology in her classroom on a regular basis. None of the other 2nd grade teachers have any experience with a makerspace; however, they are currently planning a Maker Faire in April, as they have independently initiated this opportunity to showcase their collective student makerspace work solely because they have seen the positive impact of makerspace learning when used in a colleague's classroom and they all want to bring that into their classroom. If we find that the demand for the initial mobile makerspace cart is too high to have only one cart in the district, then we will fabricate additional carts to meet the demand. High school students in the welding program will create the mobile makerspace carts based on a design by the Yale architecture students working on the project. Since the contents of the makerspace cart will focus on recycled or found objects along with some low-cost electronic resources (e.g., sensors), we will be able to fabricate an adequate number of carts to meet the need.

We have five key local non-profit partners in this project. First, as mentioned previously the Sitka Fine Arts Camp will use our mobile makerspace cart (or bus) in their summer work with students who come from around Alaska and the world. The Sitka Fine Arts Camp has access to additional grants and funding resources not available to a school district, and by partnering with them on this project we can leverage a shared investment. We currently work with the Sitka Fine Arts Camp on a number of grants that revolve around our Arts, Culture, and Technology (ACT) initiative, which is a component of this project. Another key partner will be the Sitka Tribe of Alaska. Twenty-five percent of the students in the Sitka School District are Tribal citizens. Consequently, we work collaboratively with the Tribe on all aspects of our work, and have a strong history of collaborating on projects that ensure all students are active contributors to their education.

To support the STEAM instructional component, the Sitka Sound Science Center has been one of the school district's biggest contributor of resources given to students over the past decade, and they have agreed to partner on this project. Actually, it was the Sitka Sound Science Center that first approached the Sitka School District about the opportunity to partner on a project to develop STEAM skills in students. The Sitka Sound Science Center will provide scientists to work with students, and their education staff will coordinate with our principals on various aspects of this project. The Sitka Conservation Society is another local partner who has a long history of support for initiatives that develop a conservation mindset in our students. As an example, the Sitka Conservation Society secured a grant for our high school students to build a tiny house. Our remaining partner will be the University of Alaska Southeast – Sitka Campus, which will provide credit courses for our teachers who participate in the advanced professional development opportunities. Additionally, scientists working at the campus will be available to work with students as relevant.

3. Financing

District resources have covered all costs associated with the initial phase of the **Full STEAM Ahead** project, which includes the costs to work with the Yale architecture students to design the mobile makerspace carts, the materials to fabricate the carts, and the resources to stock the cart. Additionally, district resources will cover the cost to provide a program evaluator. The remaining needs not able to be covered by the school district include the cost to develop optional curriculum that teachers can use with the mobile makerspace cart, to develop the initial professional development for all teachers in the Sitka School District, and to develop a website to house the curriculum and training materials, as well as produce some necessary hard copies of the resources. Our Crossett grant application is seeking this funding.

Our funding request is a one-time cost, as once the curriculum and professional development is developed to help teachers start to use the mobile makerspace cart our own teachers will be able to evolve the lesson plans and professional development to meet our evolving use of the resource and the evolving nature of the resource itself (e.g., cart to bus) through established summer institute lesson plan development we offer annually. We simply need to contract with a teacher(s) who is experienced in the world of makerspace to develop the curriculum to get our teachers started in using this resource, and to develop the training components. Additionally, we need to have webpage created that links to training specific to our mobile makerspace cart, as well as connects teachers to the world of Makerspace and Maker Faires. A short training video will need to be created so training and support for teachers can be just-in-time instead of pre-determined on an inservice day when the information is presented out of context and the cart may not even available at the school site.

Budget Item	Description	Cost Each	Total Cost
Professional Technical: Curriculum Design	Development of 10 vetted lesson plans at each of the following developmental levels that focus on STEAM academic content and incorporates found and/or recycled objects using makerspace pedagogy: <ul style="list-style-type: none"> • Primary (grades K-2) • Intermediate (grades 3-5) • Middle School (grades 6-8) • High School (grades 9-12) Note: Each lesson must be vetted in an age appropriate classroom and incorporate classroom teacher feedback	\$150	\$6,000
Professional Technical: Website Design	Development of a section on the district website to house Full STEAM Ahead curriculum, training and use materials, as well as links to makerspace and Maker Faire resources/information	\$2,500	\$2,500
Professional Technical: Professional Development	Development of a professional development training video and resources necessary for novice teachers to use the Full STEAM Ahead mobile makerspace cart	\$3,000	\$3,000
Supplies	Production supplies needed to produce a hard copy of the curriculum to stay with the mobile makerspace cart, and to produce hard copies of any necessary training items	\$500	\$500
Grand Total Request:			\$12,000

4. Evaluation Plan

Research Question: How does the use of maker spaces within a STEAM context change teacher's professional practice?

Measurement Markers:

- Individual interviews of teachers who have used the bus at least 8 times within a school year
- Individual interviews with administrators
- Group interview with 2 students from each classroom where the teacher used it at least 8 times a year
- Monthly invoices that notes progress
- Individual interviews of local non-profit partners
- Teacher survey regarding use of mobile makerspace cart
- Schedule of use of mobile makerspace cart

Additional Data to be Collected:

- Sampling of pictures of student projects and students and teachers using the **Full STEAM Ahead** cart
- Sitka School District Maker Fair to be held in spring 2017

Design Process Documentation:

- Written summary of progress completed in an on-going fashion by each of the design team members, which includes Yale architecture students, evaluator, district administration, curriculum designer, webpage designer, and professional development designer
- GoPro of cart fabrication process
- Sampling of pictures throughout process

5. Timeline

November-March: The **Full STEAM Ahead** mobile makerspace cart design process began in November, as has the written summary of progress completed to date and the picture documentation of the progress. The target completion date of the mobile makerspace cart is March 2016 so that 2nd grade teachers have an opportunity to use the cart to support their Maker Faire that will be held later in the spring of 2016. The Yale architecture students are currently conducting research with Sitka School District teachers currently working on integrating makerspace pedagogy with their students, and they are also working on a mock-up of their cart design. Fabrication will begin once certified professionals grant official approval.

February-June: Identified curriculum, website, and professional development consultants and have them begin to develop their deliverables.

June 30th: All deliverables are due.

July-August:

- Outfit mobile makerspace cart with items needed to implement developed curriculum
- Publish website with curriculum and training materials

September: **Full STEAM Ahead** mobile makerspace available for teacher and student use! **Thank you!**

Attachments:

- Resumes for design team members already identified
- Letters of support from local partners

