Mobius Science Center Outreach

1. **Purpose:**
The purpose of the Mobius Science Center Outreach Project is to expand mobile outreach of science, technology, engineering, and mathematics (STEM) education to underrepresented student populations in rural, tribal, and low-income communities. Additionally the purpose is to build general awareness of STEM and NGSS science initiatives in the local schools and communities, and to build capacity for STEM science teaching and learning in the region.

2. **Description of services provided:**
   a. **Impact Section I.**

   *Educational Leaders realize that the NGSS represent a new opportunity to make science relevant, interesting and meaningful for all students, their families and the broader community.*

   - In order for Mobius Outreach Program to reach more underserved students in the region, the 2016-2017 focus was on three rural school districts, Newport, Summit Valley and Evergreen, and the tribal community in the Wellpinit School District, as well as elementary schools in two urban school districts, Central Valley and Spokane Public Schools.

   - Mobius Science Center provided demonstration lessons and led students in experiments and science explorations regarding ice dams and the aquifer in classrooms and after-school programs for Steven Elementary and Roosevelt Elementary in the Spokane Public School District and Grizzly Center after-school program in the Newport School District. This curriculum was developed after collaboration with teachers to address local learning needs and expectations.

   - Field Trips included workshops at Mobius Science Center on indigenous tools, i.e. drills, and frog dissections, as well as exploration of the Mobius Science Center and the Mobius Children’s Museum. Field trips were utilized by Evergreen School District, Summit Valley School District, Wellpinit School District, and Progress Elementary in the Central Valley School District.

   - Mobius Outreach provided bussing for Roosevelt Elementary to Medical Lake for release of trout raised in the classroom and introductory programs in 1) water quality testing and 2) general ecology. Members of the Spokane Fly Fishing club provided introductory lessons in fly fishing and casting. This program was done in conjunction with Trout Unlimited’s “Trout in the Classroom Experience”. Later in the year, transportation was provided to Turnbull Wildlife Refuge for additional water testing of stream vs. lake and more general ecology information.

   - Mobius Outreach Table Events at evening gatherings for students, families and general community included Summit Valley in Addy, Grizzly Center in Newport, and Roosevelt Elementary in Spokane.

**Project Impacts**
- Build a more exciting, robust science education system in rural, tribal, and underserved schools.
• Build successful partnerships with teachers, school administrators, and community members that promote strong community support for both formal and informal science education.
• Increase critical stakeholders’ understanding of how informal education can help meet the standards and expectations of the NGSS.
• Build successful partnerships that contextualize science locally and help promote high-quality science education in the affected district.

• Since 2013: Mobius Science Center provided demonstration lessons, led students in experiments and science explorations, determined in collaboration with teachers to address local learning needs and expectations, with five School Districts: 1 middle school each in Cusick, Garfield-Palouse, Lind-Ritzville, Odessa, and three middle schools in the Spokane District; Garry, Glover and Shaw.

Project Impacts
• Build a more exciting, robust science education system in rural, tribal, and underserved schools.
• Build successful partnerships with teachers, school administrators, and community members that promote strong community support for both formal and informal science education.

• Initial Science Night – Opening Celebrations in each of the seven middle schools for the students, families and general community. The Science Nights included Mobius’s Planetarium for multiple shows, Mobius science education staff demonstrations, hands-on experiments for people to tryout, and partnerships, such as the Spokane Astronomical society bringing their telescopes. Two Districts, Odessa and Cusick were able to schedule end of the year Science Nights.

Project Impacts
• Increase critical stakeholders’ understanding of how informal education can help meet the standards and expectations of the NGSS.
• Build successful partnerships that contextualize science locally and help promote high-quality science education in the affected district.

• All seven Schools received monthly science lessons/units taught by the Mobius science educators. The content varied according to the needs of the schools, programs ready for delivery each month and interests of the students and suggestions from teachers.

Project Impacts
• Build successful partnerships with teachers, school administrators, and community members that promote strong community support for both formal and informal science education.
• Build a more exciting, robust science education system in rural, tribal, and underserved schools.

• Mobius arranged and hosted one meeting for the Informal Educators Network in late January 2014.
Project Impacts

- Increased critical stakeholders’ understanding of how informal education can help meet the standards and expectations of the NGSS.
- Build successful partnerships with teachers, school administrators, and community members that promote strong community support for both formal and informal science education that have carried forward into 2016.

b. Impact Section II.

*Implementing the NGSS in a bias-free and culturally sensitive manner will help reduce the opportunity gap and increase interest [and choices] in science, technology, engineering and mathematics related courses.*

- The ongoing collaboration with tribal elders and knowledge holders from 2015 through 2017 and beyond will allow Mobius to reach the goal of giving Native and Western science equal value. The Evergreen & Wellpinit School District communities have been especially important in promoting meetings between tribal leaders and Mobius in building toward curriculum components highlighting indigenous technology and tools.


Project Impact

- Teachers were better able to present STEM-related curriculum in a culturally sensitive manner, drawing on formally designed informal pedagogical techniques, increasing student interest and science success.
- Critical stakeholders could understand contexts in which science education is embedded and how the NGSS can best be used in these contexts.

- Each year, Mobius planned for and purchased instructional materials, consumable supplies and made or purchased equipment for the project based on the needs and science program developed for each school in the current partnership.

Project Impact

- Teachers are better able to present STEM-related curriculum in a culturally sensitive manner, drawing on formally designed informal pedagogical techniques, increasing student interest and science success.

c. Impact Section III.

*A few well-placed simple steps can make all the difference in the world for reducing the opportunity gap in sciences.*

- Meeting with new partners and including the teachers and administration of the new rural school districts of Newport, Summit Valley and Evergreen during 2015 -16 and 2016-17 allowed Mobius Outreach Program to continue to increase awareness of how informal education can be a valuable supplement to classroom lessons.

- Mobius engaged in a planning period, September 2013 through November 2014 with five school districts, Cusick, Garfield-Palouse, Lind-Ritzville, Odessa, and Spokane, prior to the
delivering project events, lessons and activities for the schools in each district. Mobius also consulted with NEWESD 101, to collaborate on needs of the region for science education.

**Project Impact**
- Build a strong understanding of and appreciation for STEM education among critical stakeholders.
- Regional science partnerships are created with the power to enhance student engagement and achievement in STEM.
- Build regional capacity to serve rural, tribal, and underserved students in a culturally appropriate manner.
- Across all project sites community members and stakeholders have increased awareness of informal education strategies, programs, and events.

3. **Criteria for receiving services and/or grants:**
   a. Those receiving services from Mobius Science Center as part of this Grant are from populations underrepresented in STEM courses and STEM careers and from low-income communities, as per the Grant application.
   b. The schools’ students qualify as “underrepresented populations:” two Title I Schools in the Spokane District, 3 rural schools and 1 rural Tribal School.
   c. The rural schools Free/Reduced-Price Meal range from 29% to 43.9%, the tribal school’s percent is 56.9, the two Title I schools from the Spokane District range from 73.1% to 84.4%. (OSPI, 2013).
   d. “The Mobius Science Center project was interested in differences in student outcomes for those underrepresented in STEM. The Mobius Science Center project defined the entire sample of students as underrepresented in STEM because of the rural locale. The research literature defines females as underrepresented in STEM along with African Americans, Hispanics, and Native Americans” (RMC Evaluation Report, June 2014).

4. **Beneficiaries in 2016-2017 School Year:**
   - # School Districts: 5
   - # Schools: 7
   - # Students: 567
   - # Community: 415

5. **FY17 Funding:**
   - State Appropriation: $100,000
   - School District Funds: $0
   - Corporate Funds: $0
   - TOTAL (FY17): $100,000

6. Are Federal or other funds contingent on state funding: No

7. First year funded: FY 2014

   State funding since inception:
<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Amount</th>
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<tbody>
<tr>
<td>FY17</td>
<td>$100,000</td>
</tr>
<tr>
<td>FY16</td>
<td>$100,000</td>
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<tr>
<td>FY15</td>
<td>$100,000</td>
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<tr>
<td>FY14</td>
<td>$100,000</td>
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</tbody>
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8. **Number of beneficiaries (e.g., schools, students, districts) since inception:**

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th># of School Districts</th>
<th># of Schools</th>
<th># of Students</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Classrooms:</td>
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<td></td>
<td></td>
<td></td>
<td>325</td>
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<td></td>
<td></td>
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<td>MSC Field trips &amp; Workshops: 242</td>
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<tr>
<td>FY17</td>
<td>5</td>
<td>7</td>
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<td></td>
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<td></td>
<td>Community Science Events: 415</td>
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<td></td>
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<td><strong>Total: 982</strong></td>
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<tr>
<td>FY16</td>
<td>5</td>
<td>7</td>
<td>Classrooms: 541</td>
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<tr>
<td>FY16</td>
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<td>Community Science Events: 1119</td>
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<td><strong>Total: 1660</strong></td>
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<tr>
<td>FY15</td>
<td>5</td>
<td>7</td>
<td>Classrooms: 501</td>
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<tr>
<td>FY15</td>
<td></td>
<td></td>
<td>Initial Science Nights: 1450</td>
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<td><strong>Total: 1951</strong></td>
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9. **Programmatic changes since inception (if any)**

**FY 2016-2017:**
Collaboration between Mobius, teachers, school districts, and tribal leaders continued to strengthen the relationships and trust of all stakeholders. Programming focused on weaving together the history of the Missoula Floods, current status of waterways, and options for healthy ecosystems in the future. The programs goal is to incorporate the multiple cultures and histories of the area and give Native and Western science equal value.

**FY 2015-2016:**
Since this is the first year of the new biennium of funding, Mobius will spend most of the year developing relationships and partnerships that will continue through Year 2 and beyond. For each District, they have worked with Superintendents, Principals, District representatives, and teachers to collaborate on how best to serve everyone involved. These efforts in building sustainable relationships did take more time that originally anticipated. However, Mobius wants to ensure solid partnerships with strong commitments for this grant and the future. Programming will focus on the Spokane Valley-Rathdrum Prairie Aquifer and the multiple cultures and histories of the area and will incorporate both Native and Western science with equal value.
FY 2014-2015:
Year 2 of this iGrant was completely redesigned to include more rigorous melding of formal and informal STEM learning experiences for students and teachers. Every school in the Project extended their learning through three different STEM modules throughout the school year. Each module included three monthly Mobius staff presented interactive sessions including:

- **Unit 1: CSI (Curious Scenario Investigations)**
- **Unit 2: Hoover Craft: Air, Land & Sea**
- **Unit 3: Biomed/DNA Discoveries: Plants and Animals**

The modules continued to build complexity each month, presenting a scenario science problem to solve and multiple tasks leading to solutions and conclusions to the problems through integrated STEM content and skills practices.

We also made a change in our efforts for inviting and providing professional development with informal educations in the region. We conducted a workshop focused on NGSS and melding formal and informal pedagogies. Sixteen organizations attended the first workshop and decided to make the group a continuing network of informal educators. The next informal educators’ workshop is October 14, 2015.

We made a third change in the structure and flexibility for the community science events. Some schools continued with the “science nights” other districts and schools decided on daytime science events. We also had better response from partners invited to participate and expand the diversity of community science content and concepts. Regular partners at our community science events included: Spokane Regional Clean Air Agency, WUS graduate students, EWU Anthropology Society, IEUCC 811 safety, Spokane Falls Community College, Rock Roller Club, and City of Spokane Waste Disposal.

We also adjusted the timing for contacting our School Districts about Field Trips to Mobius Science Center. Four of our five Districts took advantage of this iGrant option with a total of 227 students plus teachers and parent chaperones. This was a significant increase over the one School District making a field trip to Mobius in Year 1.

Two part-time staff to our iGrant for FY 2014-15 to better deliver our newly developed scenario modules and rigorous learning expectations. This involved making a budget adjustment, moving monies from different budget lines into teaching/staff. We were able to provide more materials and equipment intense sciences and much more individualized student contact.

10. **Evaluations of program/major findings, FY 2016-2017:**
Eastern Washington University provided a graduate student and advisor to fulfill the evaluation process. Dr. Bev Clevenger, the Mobius Director of Education acted as an onsite mentor. Mobius has not received the results of this evaluation. The EWU Education Department indicated that they will have the evaluation results by mid-September 2017. Many programs were executed in the final two months of the school year. End of year duties may have contributed to the lack of response to the surveys sent by Mobius staff. A follow-up survey is being sent when teachers return to work the last week of August 2017. Additionally, Spokane School District has made time for Mobius to interact with teachers during the District orientation days in August 2017 in order to begin outreach programming in the classrooms earlier in the school year.

**Evaluations of program/major findings, FY 2015-2016:**
Mobius will be working with a graduate student and advisor at Eastern Washington University to fulfill the evaluation process with the Mobius Director of Education and Programs acting as the onsite mentor. Mobius will also do separate student, community, and educator feedback surveys in addition to the outside evaluation.

Evaluations of program/major findings, FY 2014-2015:
The evaluation processes for Year 2 of this Mobius iGrant Project changed as Mobius work with students, teachers, informal educators, and partners made extensive changes from the previous Year’s Project. The changes resulted from a complete change in Project leadership and staffing. After consulting with OSPI and based on the major changes made for the second year of the iGrant Project, Mobius and RMC Research mutually agreed to end our contract in February 2015. The surveys, logic model upon which the RMC Evaluation was aligned no longer applied to the Mobius Project.

Before beginning Year 2 in the schools with students, the Mobius Education team met with each school’s Principal and the teachers participating in the Project. We consulted with them to determine some possible topics and specific science concepts and requirements for learning. We then built science learning module Units with formative and summative assessment tools and student booklets for the project year 2.

Our evaluation process became more focused on student learning demonstrations, teacher professional development, instructional modeling, and specific STEM and NGSS standards for learning. We moved away from the Year 1 surveys developed and administered by RMC Research Corporation.

Assessing Student Learning:
1. Students were more engaged in the science learning tasks and tests with the longer more rigorous Units of learning – more persistence was evident as they continued for longer periods of class time and continued their work over three months for each Unit Scenario.
2. Students demonstrated their learning with workbook entries, science experiments measurements, documentation and presentations of their findings, and conclusions at the end of each Unit.
3. Student learned to work cooperatively in teams with limited resources shared throughout their science experiments and constructions.

4. Mobius education staff made observations of student learning, coached students individually and in teams, and extending expectations with more complex tasks when needed.

5. Students provided Mobius staff with samples of their work to use in summative and formative assessments:

NGSS & STEM – Formal and Informal Teacher Assessments:

The evaluation process for Year 2 with both informal and formal educators relied primarily on joint planning, teacher feedback in every classroom session, working with teachers in classrooms to be more a part of the teaching process with the Mobius staff, adjusting learning Units and tasks based on the needs of the teachers and the students. We frequently made improvements based on teacher suggestions, sometimes from one school to the next, and from one month to the next within the Units.

We also worked individually with classroom teachers on taking some of the assignments for materials distribution, monitoring student teams, and assisting with student behavior management.

Two formal educators became our "tasks testers" in new Units. In some cases we practiced with the teachers and made adjustments to tasks before using them with students.
Our Informal Educator Workshop was not only developed in partnership with ESD 101 and with Greater Spokane Incorporated (GSI, regional Chamber of Commerce) it became, at the request of the participants, an ongoing network for regional informal educators for non-profit organizations, state and city agencies, and education related initiatives.

The individual feedback gathered at the first workshop indicated that participants found the workshop valuable for creating more experiential versions of their own science lessons and curricula, better understanding of the interplay of STEM and NGSS, and that they wanted to continue learning with each other.

**Community & Partnership Engagement Assessments:**
We determined the degree of success with partners for the community science events by the number of partners who participated by bringing their science to the events and by the number of times they continued participating in the different school communities.

Six of our seven consistent community event partners were new for us in Year 2 of the Project. Five of the partners worked with us at more than one community science events. This was particularly notable as some of our school communities were more than an hour’s drive from the partners’ locations.

We believe that we were able to enlist more partners more often because we scheduled the community events with schools earlier in the year and because we entertained community schedules in the evening and during the day, as needed.

11. **Major challenges faced by the program in Year 4 (FY 2016-17):**
- One of our urban school districts, Central Valley, only utilized the field trip portion of the programs. There was no response from teachers for in-class programs despite continued follow-up requests by the Outreach staff.
- Snow & ice storms isolated most of our rural districts. School closures led to reduced communication and road closures led to a buildup of programming to finish before the end of school.
- Since many programs were finished in May and June, internal Mobius evaluations were delayed by summer break.
- Approval by the EWU Internal Review Board (IRB) of the evaluation criteria used by the evaluating graduate student as being ethical and appropriate for children took longer than expected, delaying the delivery of the EWU evaluation.

**Major challenges faced by the program in Year 3 (FY 2015-16):**
- Communication with districts over the past year was slowed on occasion due to unavoidable weather/disasters (wildfires).
- In larger districts, more schools requested to be part of the project than Mobius can effectively serve. Mobius’ commitment to build capacity challenges them to develop ways to invite larger groups of educators in these districts without reducing the effectiveness or high quality standards in each of the participating

**Major challenges faced by the program in Year 2 (FY 2014-15):**
- Most of the challenges encountered in Year 1 of the Mobius iGrant Project had been eliminated or corrected by Year 2.
  1. We instituted a new scheduling routine that included providing all of the Project participants with calendars for the year adjusted monthly, to everyone.
2. Meeting and planning with teachers and administrators before beginning with the students in classrooms generated more confidence in the Project and our expected outcomes, for everyone. Adding staff and presenting with two, three and even four Mobius staff in the schools, depending on size of student populations and classes, allowed more time with students and with teachers.

3. We were able to make immediate adjustments to teaching and learning needs in real time with our additional staff persons, and to rely on observational assessments and student work, rather than waiting for survey and attitudinal feedback results from RMC.

4. Our greatest challenge in Year 2 (2014-2015) was providing enough time to all classes for the more complex, rigorous and experiential science Units. Students and teachers expressed wanting more time.

Year 1 (2013-2014 Challenges – overcome)

a. Program calendaring with 7 schools, some more difficult to gain responses from than others. However, this became less of a problem as Mobius and schools built relationships through the project.

b. Scheduling schools in the winter and spring for field trips and for spring Science Nights.

c. Staff time for travel and implementation at schools/communities.

d. Developing volunteers and staff in formal and informal teaching and learning practices for integrated experiential and immersive strategies.

e. Collecting evaluation data from participants, especially students’ parents.

f. Outreach staff was inconsistent in asking for and collecting data from teachers and students.

g. Mobius faced specific challenges in providing ongoing communication and documentation after May 2014, due to major organization staff and leadership changes.

h. Due to changes in staffing, Mobius did not “hand-off” communication with the RMC evaluators to a designated staff person until early summer.

i. Two of the Mobius primary staff serving the Grant schools left Mobius before the end of Year 1 of the Grant, leaving only 1 part-time staff person available to deliver months (between February and May 2014) of the Grant services.

j. A new Director of Education was hired in August 2014 – preparing this report without Grant Project background or consistent documentation.

12. Statutory and/or Budget language:

Budget Proviso: ESSB 6052 – Section 501 (18) - $100,000 of the general fund-state appropriation for fiscal year 2016 and $100,000 of the general fund-state appropriation for fiscal year 2017 are provided solely for the Mobius science center to expand mobile outreach of science, technology, engineering, and mathematics (STEM) education to students in rural, tribal, and low-income communities.

13. Program Contact Information:

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