



## **Museums for America**

**Sample Application MA-11-15-0138-15**  
**Project Category: Learning Experiences**  
**Funding Level: \$5,000-\$25,000**

### **Discovery Center at Murfree Spring (Children's Museum Corporation of Rutherford County)**

Amount awarded by IMLS: \$20,788

Attached are the following components excerpted from the original application.

- Abstract
- Narrative
- Schedule of Completion

Please note that the instructions for preparing narratives for FY2016 applications differ from those that guided the preparation of FY2014 and FY2015 applications. Most obviously, the names of the three narrative sections and the order in which they appear have changed. Be sure to use the narrative instructions in the FY2016 Notice of Funding Opportunity for the grant program and project category to which you are applying.

## Children's Museum Corporation of Rutherford County – Project Abstract

Children's Museum Corporation of Rutherford County, dba Discovery Center, plans to expand our STEAM Bus program by providing outreach visits to two under-served, rural elementary schools in Bedford County, Tennessee.

The Discovery Center STEAM Bus addresses the need for substantive informal science education in rural elementary schools and provides an innovative solution to the lack of time and funding for students to visit museums during the school day. This program will increase opportunities for rural students to explore STEM concepts and encourages lifelong learning of STEM subjects.

Each 3rd, 4th, and 5th grade class at two Bedford County elementary schools will receive eight visits from the STEAM Bus with hands-on, discovery based science lessons that compliment Tennessee state curriculum standards. The STEAM Bus visits and lessons will be provided at no cost to either school. Lesson plans will be thirty to forty minutes in length and will include hands-on discovery-based activities to be explored and completed on the STEAM Bus. This will result in the completion of at least twenty-four unique lesson plans (eight visits times three grades). More may be developed if multiple concepts can be taught in the allotted time frame.

The primary audience of the STEAM Bus for the 2015-2016 school year are 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade students at Learning Way Elementary and Thomas Magnet School in Bedford County Schools. Bedford County schools were chosen based on their proximity to the potential reach of the STEAM Bus and their demographics. There are twenty-two classes and 440 students among these grades at these two schools. Shelbyville, the county seat of Bedford County and the city in which these two schools are located, is a diverse rural community. Learning Way Elementary and Thomas Magnet School have higher than average minority populations for the state of Tennessee with minorities making up 59.1% of students at Learning Way and 33.6% of students at Thomas Magnet School. In addition, 92.6% of Learning Way Elementary students and 47.3% of Thomas Magnet School students qualify for the federal free or reduced lunch program according to the Tennessee Department of Education's 2013 Report Card.

The intended outcomes of this program are to increase hands-on STEM learning opportunities for rural students, increase positive attitude towards science in 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade students, help develop a capacity to productively engage in STEM learning activities, and increase awareness of STEM careers.

The success of the program will be measured by the number of visits completed to each class as well as the active participation in the STEAM Bus lessons. Through pre and post program surveys, we will measure any change in curiosity about STEM topics, student confidence in science skills, and desire to work in STEM related fields.

## 1 - Project Justification

### *What do you propose to do?*

In 2012, Children's Museum Corporation of Rutherford County dba Discovery Center received a grant from the Institute of Museum and Library Services for the creation of a mobile science laboratory and corresponding outreach programs. Since being awarded that grant, Discovery Center has created the mobile STEAM Bus and completed a full semester of outreach visits. Outreach visits from January 2014 through May 2014 included eight hands-on lessons presented to each of the forty-eight 4th grade classes in Murfreesboro City Schools. We have received tremendous feedback and evaluation results from year one of this partnership (see Supportingdocument1.pdf) including the following metrics:

- 92% of teachers responded that the program offers their students opportunities they could not have obtained in the classroom.
- 85% of teachers responded that the STEAM Bus and Super Science program increased their students science skills
- 80% of teachers responded that their students interest in-class science lessons increased during the school year

In our second year of this outreach partnership with Murfreesboro City Schools, we have increased the program with the addition of two schools and a total of fifty-four 4th grade classes.

Once the 2014-2015 school year is complete, the STEAM Bus will be available to book as a paid Mobile Lab experience for any school or organization within a sixty mile radius of the center. However, the modest fee for a STEAM Bus visit from Discovery Center is still prohibitive from many schools and organizations that may benefit most from this experience. ***Discovery Center is requesting funds from the Institute of Museum Library Service's Museums for America program to expand the reach of the STEAM Bus and outreach programs into rural communities in middle Tennessee.*** Discovery Center plans to expand the STEAM Bus program to neighboring Bedford County focusing our hands-on science lessons for 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade students at Learning Way Elementary and Thomas Magnet School (See Supportingdocument2.pdf). Each class would receive eight visits from the STEAM Bus with hands-on, interactive science lessons that compliment Tennessee state curriculum standards. The STEAM Bus visits and lessons would be provided at no cost to either school.

### *What need, problem, or challenge will your project address and how was it identified?*

In 2010, the President's Council of Advisors on Science and Technology stated that STEM education will determine whether the United States will remain a leader among nations and whether we will be able to solve immense challenges. The U.S. Department of Commerce Economics and Statistics Administration's 2011 report, "STEM: Good Jobs Now and for the Future," maintains the need for STEM education by projecting a growth of 17 percent from 2008 to 2018 for STEM related occupations, compared to a 9.8 percent growth for non-STEM occupations. However, too many students simply think that STEM subjects and STEM-related jobs just aren't for them. This is particularly true in underserved, rural communities.

The 2013 High School Benchmarks report from the National Student Clearinghouse Research Center shows that rural students are less likely to attend college than their urban or suburban peers and those who do are less likely to choose a four-year institution. Low-income rural schools had the worst college-enrollment rate at 50 percent, compared to 55 percent for similar-income urban schools with few minority students. However, the STEM pipeline narrows even earlier. Research documents that by the time students reach fourth grade, a third of boys and girls have lost an interest in science. By eighth grade, almost 50 percent have lost interest or deemed it irrelevant to their education or future plans. At this point in the K–12 system, the STEM pipeline has narrowed to half. As a result, millions of students have tuned out or lack the confidence to believe they can do science. (National Center for STEM Elementary Education at St. Catherine University)

Michele Timmons, a former Manager of Partnership Development and Technical Assistance Coach for EDWorks, states that many rural school and district leaders have shared their frustration that they just don't have big businesses in their communities that can offer students hands on opportunities in STEM fields. Without partners, it is very hard to develop truly authentic learning experiences for students to grow in their passion and understanding for STEM. Educators surveyed from Ohio, Pennsylvania, and West Virginia believe that to strengthen STEM offerings in rural schools, businesses should help fund STEM-related programs and offer field trips for students. And outreach efforts are not just needed for low performing schools. Research shows that schools are consistently failing to provide challenge to the top students. The Jack Kent Cooke Foundation found that while 90 percent of high-achieving high school students attend college, regardless of income level, lower-income high achievers are less likely to graduate.

In addition to the need for an increase in the STEM pipeline, Tennessee students continue to lag behind other states in science proficiency. The National Assessment of Educational Progress's 2011 Science Report Card shows only 31% of Tennessee 8<sup>th</sup> graders are proficient or advanced in science. Tennessee's own 2014 Department of Education Report Card shows less than 65% of 3<sup>rd</sup> through 5<sup>th</sup> grade students are proficient or advanced in Science with only 56.7% of 4<sup>th</sup> grade students testing proficient or advanced on the Tennessee Comprehensive Assessment Program (TCAP) test.

By providing hands-on, science lessons directly to the students with the STEAM Bus, Discovery Center will bridge the gap between curiosity driven inquiry and formal learning environments. The STEAM Bus program increases opportunities for rural students to explore STEM concepts and encourages lifelong learning of STEM subjects.

*Who or what will benefit from your project?*

The primary audience of the STEAM Bus for the 2015-2016 school year are 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade students at Learning Way Elementary and Thomas Magnet School in Bedford County Schools. Bedford County schools were chosen based on their proximity to the potential reach of the STEAM Bus and their demographics. There are twenty-two classes and 440 students among

these grades at these two schools. Shelbyville, the county seat of Bedford County and the city in which these two schools are located, is a diverse rural community with 20,335 residents and a population density of approximately 1,041.3 people per square mile. Learning Way Elementary and Thomas Magnet School have higher than average minority populations for the state of Tennessee with minorities making up 59.1% of students at Learning Way and 33.6% of students at Thomas Magnet School. In addition, 92.6% of Learning Way Elementary students and 47.3% of Thomas Magnet School students qualify for the federal free or reduced lunch program according to the Tennessee Department of Education’s 2013 Report Card. In addition to demographics, Learning Way Elementary was selected as a target school due to consistently low TCAP scores (See Table 1).

*Table 1  
Learning Way Elementary  
Grades 3-8: TCAP Criterion Referenced Academic Achievement*

	2011		2012		2013	
	Grade	Score	Grade	Score	Grade	Score
3-8 Science	F	38	F	39	D	42

Scores at or above 50 indicate that performance in the subject met or exceeded the average performance across the state in 2008-2009. Grades are assigned according to the following scale: 55-99, A; 50-54, B; 45-49, C; 40-44, D; 0-39; F.

*What are the performance goals and intended results of your project?*

Research shows that students in activity-based programs also exhibit increases in positive attitudes toward science, perception, and logic development. At the end of this grant, the STEAM Bus will have increased opportunities for rural elementary grade students to experience hands-on science. It will reach 400 students in 3<sup>rd</sup> through 5<sup>th</sup> grade who will show an increased interest in STEM fields and demonstrate positive student attitudes and perceptions towards science and scientists.

*How will your project advance your institution’s strategic plan?*

The project fits well into the strategic goals including:

- Education: Expansion of partnerships with regional public and private schools
- Education: Implement educational programs for teachers, students and families that will address key needs identified in partnership with area schools.
- Education: Increase inquiry-based & informal educational opportunities for school children.
- Education: Address key concerns raised by teacher and visitor evaluations and staff observations.
- Public Relations: Increase public awareness of Discovery Center as a partner in K-12 education

This program also fits into the Tennessee STEM Innovation Network's Tennessee STEM Strategic Plan which includes a goal to reduce the state's STEM talent and skills gap by increasing partnerships between business and education.

## 2- Project Work Plan

### *What specific activities will you carry out?*

Our current science outreach program (formerly Super Science) has been in place for five years, and we have developed over 20 successful lesson plans for 4<sup>th</sup> grade over the years. However, with the addition of 3<sup>rd</sup> and 5<sup>th</sup> grade in 2015-2016 and an internal review of the current program, we will reorganize our program and supplies inventory to allow for this expansion. The program coordinator will survey teachers at both schools to determine the top science concepts the teachers feel hands-on exploration would be most beneficial to their students. The coordinator will develop lesson plans for each grade tailored to meet these concepts. Lessons plans will be thirty to forty minutes in length and will include hands-on discovery-based activities to be explored and completed on the STEAM Bus. Each class would receive eight visits from the STEAM Bus during the 2015-2016 school year. This will result in the completion of at least twenty-four unique lesson plans (eight visits times three grades). More may be developed if multiple concepts can be taught in the allotted time frame. Since the STEAM Bus can only see six to seven classes per day, we anticipate two days per school to rotate through all the classes.

### *Who will plan, implement, and manage your project?*

The STEAM Bus and outreach programs will be carried out by a Mobile Education Coordinator under the direction of Tara MacDougall, CEO, who will serve as Project Director. Courtney Morgan, Mobile Education Coordinator, is responsible for the maintenance and upkeep of the STEAM Bus, planning and implementing the program, overseeing the administering of evaluations, and continuing to interface with the target audience. Ms. Morgan has been in charge of the STEAM Bus and the former Super Science program since 2012. She earned a Bachelor's of Science in Biology from Lee University. She has over eight years of experience in teaching Environmental and Science programs, and she is also a certified Project WET, Project WILD, and Project Learning Tree educator. A temporary Outreach Education Coordinator (TBD) will be hired to assist Ms. Morgan with these rural outreach visits.

### *When and in what sequence will your activities occur?*

With the expansion to include 3<sup>rd</sup> and 5<sup>th</sup> grades in 2015-2016, Ms. Morgan will survey teachers and develop lesson plans beginning in October 2015. Pre-surveys will also be administered to the students, and the Discovery Center will also hire, or promote from within, an Education Specialist to assist Ms. Morgan. Visits would be made to the schools in November 2015 and then February through May 2016. Learning from our current program, the cold and unpredictable nature of Tennessee weather in the winter months of December and January makes scheduling visits challenging. Additional visits may be made during those months if weather permits. Post surveys and evaluations will be administered to the students and the teachers in May 2016.

### *What financial, personnel, and other resources will you need to carry out the activities?*

Discovery Center will require grant funds to carry out these outreach activities. We anticipate 990 staff hours are needed to complete this project which includes our Mobile Education Coordinator, one Education Specialist, and the CEO. We also require grant funds for the operation and maintenance of the STEAM Bus as well as additional grant funds for consumable program supplies.

*How will you evaluate your project? How will you track your progress toward achieving your performance goals and intended results?*

We do not currently have funds available for an outside evaluation. Our goal is to work with Middle Tennessee State University (MTSU) in providing an in-kind external evaluation of the project. The simple evaluation plan will focus on assessing the leadership team's progress toward completing tasks of the project and provide for quality informal science instruction to participants. A formal partnership for this specific program was not confirmed by this grant deadline. However, we have a strong history of successful collaborations with MTSU including recent proposal submitted to the National Science Foundation's Advancing Informal Science Learning grant program.

Discovery Center will conduct an internal evaluation of the STEAM Bus and corresponding programs. This evaluation will include formative and summative evaluation and will build on data compiled over the last several years of our STEAM Bus/Super Science program. Formative evaluation will be done before the outreach program begins and focus on the needs as seen by teachers regarding science curriculum. Summative evaluation will be done at the conclusion of the program and focus on the effectiveness and impact of the program on students' attitudes and self-efficacy towards science.

Discovery Center will keep a record of demographics of students and visitors participating in the program as well as the number of classroom visits and community outreach visits.

*How and with whom will you share your project's results?*

Discovery Center plans to share project results from student and teacher evaluations with Bedford County Schools and the Tennessee Department of Education through written reports. We also plan to share results with professionals in the museum field through conference presentations, or possibly video/podcasts, for associations we hold membership in including the Tennessee Association of Museums, Museum Advocates, Association of Children's Museums, and the Association of Science and Technology Centers. The project activities will also be featured in the Discovery Center blog at certain times during the project.

### **3- Project Results**

*How will the knowledge, skills, behaviors, and/or attitudes of the intended audience change as a result of your project? What performance indicators will you use to measure this change? What are the proposed targets for these performance indicators?*

IMLS funding for STEAM Bus outreach visits will enable the museum to better serve rural communities in our area with hands-on, STEM experiences. The intended learning outcomes for

students involved with the STEAM Bus are to show an increased positive attitude towards science as well as increased confidence in science abilities.

<b>Outcomes</b>	<b>Indicators</b>	<b>Targets</b>
Increase hands-on STEM learning opportunities for rural students	Number of visits completed to schools	Two schools in rural Bedford County receive eight visits each from the STEAM Bus
Increase positive attitude towards science in 3 <sup>rd</sup> , 4 <sup>th</sup> , and 5 <sup>th</sup> grade students	Active participation in STEM learning opportunities  Curiosity about STEM topics, concepts or practices	900 3 <sup>rd</sup> , 4 <sup>th</sup> , and 5 <sup>th</sup> grade students participate at each set of visits  50% of participants indicated at least one of the following: -they have researched additional information on STEM topics through television shows, books or online research  - they have shared concepts from the program with friends or family  - they have enrolled in or attended other STEM learning experiences
Develop a capacity to productively engage in STEM learning activities	Increased confidence in science skills	50% of participants indicate their science skills are better after participating in the program
Increase awareness of STEM careers	Desire to work in STEM related fields	50% of participants indicate they would like a career in a STEM related occupation when they grow up

*How will you compare the proposed targets to actual outcomes?*

Attitudes toward science will be assessed in pre-post surveys administered to all student participants. Students will be asked whether they liked science and whether they felt they were good at science. Other questions include whether students like activities such as science experiments or would participate in a science club. The post-survey has two additional questions that ask how often students enjoyed the program and whether they felt participation had improved their science abilities. This is a modified survey adapted from The University of Massachusetts Donahue Institute Research and Evaluation Group and the Massachusetts



College of Liberal Arts / Berkshire Region Got Math? program survey. It is included in their report to the Massachusetts Department of Higher Education, "Increasing Student Interest in Science, Technology, Engineering, and Math (STEM): Massachusetts STEM Pipeline Fund Programs Using Promising Practices."

Another evaluation tool to assess the impact of the program on participants' attitudes, self-efficacy, and motivation to learn science, is the Modified Attitudes towards Science Inventory (mATSI), developed by Molly Weinburgh and Donald Steele in 2000. This assessment measures students' attitudes towards science related to such factors as students' perceptions of the science teacher, anxiety toward science, value of science in society, self-concept toward science and desire to do science. It will be administered as a pre- and post-survey if the project team feels additional data is needed.

To examine the impact of the program on participants' views of science and scientists, some students may complete the Young Children's Views of Science (Lederman, 2009) questionnaire. Since this is an oral interview protocol, it will only be feasible to perform this survey with a small subset of students as a pre- and post-exercise. This evaluation method will also be dependent on the formal evaluation partnership with MTSU.

Teachers will also be surveyed pre-program to determine a needs assessment for the lessons. A post-program survey will also be administered to determine the value of the program and its effects on their students.

Assessment examples are available in Supportingdocument3.pdf.

*What tangible products will result from your project?*

The tangible products of this project include the creation of at least twenty-four hands-on, curriculum based science lessons for 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade.

*How will you sustain the benefit(s) of your project?*

We currently have annual support from the Dan and Margaret Maddox Charitable Trust for the STEAM Bus program. We will also actively seek annual sponsors for the Bus as well as additional annual sponsors for the program. Lesson plans developed for the STEAM Bus will be utilized in the museum for public programs and camps allowing for children and families of all ages and backgrounds to experience informal science learning. The STEAM Bus is also be available as a paid mobile lab program to adjacent counties. This initiative will expand our outreach and visibility outside of Rutherford County. We feel the greater exposure to Discovery Center will sustain this program as it builds earned income through increased museum visitation as well as increased reservations for the mobile lab program.

