shaping outcomes
MAKING A DIFFERENCE IN LIBRARIES AND MUSEUMS

Students STEM Demonstrator Volunteer Program

This case is based on a real logic model developed by a participant in Shaping Outcomes Continuing Education. For more information, please see the attribution box at the end of the logic model.

Case Overview

In a world that is becoming more and more technology driven, Science, Technology, Engineering, and Math (STEM) programs are becoming more necessary for today's youth. STEM allows students to explore subjects in new and exciting ways, helping them to apply concepts learned in school to everyday situations.

Student volunteers at the Bradbury Science Museum explore STEM subjects through a variety of modern digital technologies. They innovate, create, design, experiment and learn how science, engineering, and math apply to items they use on a daily basis.

Students also use Lego Mindstorms to collect data with scientific sensors, where they can experience science in a new way. The various sensors help them learn about acid rain, soil pH and water absorption, as well as sunscreen efficacy.

Many students do not realize that engineering takes all the math and science they have ever learned and applies that knowledge to real-world products, processes, systems and things: from bridges and buildings to cell phones and video games. STEM allows students to build on the skills they already have, in a setting that is fun. For example, using mathematical principles, students design Ferris wheels on a computer, allowing them to learn about tangents, diameter, and radius in a visual, exciting way.

The Bradbury Science Museum STEM program provides students with the tools and knowledge to understand the world around them, while fostering an appreciation of the necessity to learn more what are often viewed as more difficult subjects.

For more information, visit: http://www.lanl.gov/museum/

Profiles of Stakeholders

These are fictional statements typifying attitudes and illustrating needs, not actual direct quotations.

Bradbury Science Museum

"We were thrilled to have so many students interested in volunteering at the Museum. We have found that young people bring so much enthusiasm and energy with them, and that bubbles over to our visitors. The volunteers were so quick to learn and to share their knowledge with others. This was a very rewarding experience for all involved."

Students

"I was only kind of interested in engineering when I began the STEM program. After seeing what cool things I could do with this sort of education, I am very excited about seeking a degree in this field. I know that volunteering will also give me an advantage over other students when it comes time to apply to college because I already have some engineering knowledge, and I have given back to my community, which colleges really encourage."

Homeschooling Parents

"Homeschooling can be very challenging with more difficult subjects such as science because there are not a lot of authentic examples I can give to my daughter since we do not have a lab here at home. Volunteering at the Museum gave my daughter a better understanding of more complicated STEM concepts, and now she is very interested in pursuing a career in science. This was a wonderful experience for her, but also for me as she had so much to share with me every day that she volunteered. It has definitely brought us closer!"

School Districts

"Being able to give our students some practical experience in the sciences has been rewarding to all involved. Not only have students given their time to the community, but they have also given presentations here at school, encouraging others not only to get involved in science but also to find ways to use their interests to become more active in the community, whether their interests lie in the sciences or in other fields."

Los Alamos National Laboratory

"We are gratified that so many students volunteered to learn more about the sciences, and feel that our funding of this project has paid dividends now in sparking interest, but also will continue to pay dividends as many of these youth will consider seeking degrees in the STEM subjects. Further, it is our hope that once they have gone to college, they will consider coming back and working in our community."

Logic Model Worksheet

I. Situation: program partners and stakeholders	
What is the program's **name**?	**Student STEM Demonstrator Volunteer Program**
What **partners** are involved?	Bradbury Science Museum 3 school districts in northern New Mexico: Los Alamos, Española, and Northern New Mexico Home School Community.
Who are the program's **stakeholders**? (Be sure to include yourself, your target audience, partners, funders and any other stakeholders.)	What does each **stakeholder** want to know?
Bradbury Science Museum	Does this program meet our mission requirements for developing the workforce of the future? Does this program fit well with the other educational programs we offer? Is the program effective? Is our investment of staff time and money in this program well-spent? How many students will participate—how many will become well-trained, enthusiastic volunteers? Are we able to demonstrate effectiveness? Will these volunteers make a positive difference in educational outreach for the Bradbury Science Museum?
5th-12th grade students from the participating school districts and groups.	Will I like the program? Will enough of my friends take part so that it is more fun for me? Will I meet new friends? Will it be comfortable working at the Museum? Will I be rewarded for the volunteer job I do?

School districts and teachers	Will the time students spend on the program, and away from their usual studies, be beneficial? Will they really learn STEM concepts and scientific critical thinking? Does it effectively supplement our usual curriculum?
Home school community	Is the program an effective supplement for home school plans used by parents? Will it be worth the time? Will its schedule fit with home schooling needs? Will it provide positive social networking for the children?
Parents	Is this a worthwhile activity for my children? Will its goals and activities mesh with what I want for my children?
Los Alamos National Laboratory (governing body and funder)	How many students, at what grade levels, will participate? Is it more effective for some grade levels? What students are more interested in STEM and in science careers? How well will the program operate? Can you demonstrate an impact on these students—how many will achieve the outcomes you have designed?
II. Program planning: connecting needs, solutions, and results	
Who are the **audiences**?	5th – 12th grade students from Los Alamos Public, Española Public, and Northern New Mexico Home School Community (LAP, EP, NNMHS)
What are the **needs** of the audience?	Student interest in STEM topics drops off from elementary school into middle school and into high school. Students do not consider careers in STEM fields as available to them, since they lack confidence and interest in STEP topics. Jobs in other fields do not usually pay as well as STEM jobs in northern New Mexico, leaving this audience in depressed economic standing.

What are some **audience considerations?**	For young people at this age, activities must be "cool" to do. There has to be enough of their own stamp on the program to be comfortable and relevant to them. The STEM topics need to be relevant to their lives. Students will need to have time and transportation available to attend the program and the volunteer sites.
What **solution** fulfills the needs?	Create a STEM-oriented volunteer program through a noted science museum: Bradbury Science Museum. Participants will learn STEM concepts as embodied in daily life activities, and will act as volunteer demonstrators for other students.
What will be the **desired results?**	Participants will demonstrate more knowledge of, interest in, and enthusiasm for, STEM topics. Students will feel competent and prepared to explain a STEM topic to someone else. Students will be able to envision themselves as pursuing a career in a STEM field.

III. Logic model summary: program purpose statement

We **do** what?	Develop and deliver a Science, Technology, Engineering, and Math Demonstrator Volunteer program at the Bradbury Science Museum and on-site at northern New Mexico schools.
For **whom**?	5th – 12th grade students from Los Alamos Public, Española Public, and Northern New Mexico Home School Community (LAP, EP, NNMHS)
For what **outcome**/benefit(s)?	Participants learn about STEM topics; participants show interest in learning more; students pursue their newly-developed STEM interests with further education and/or career aspirations.

IV. Program elements

Inputs	**Outputs (or counts)**

Museum staff: Program project manager Student volunteer coordinator Intern Educators as content and delivery trainers, coaches	# of hours or percentage of FTE
Computer and printing supplies	$ spent on consumables
Volunteer demonstration supplies	$ spent on durable and consumable items
Transportation	Mileage reimbursements
Activities	**Outputs (or counts)**
Marketing and outreach Involve students from the beginning and throughout the program. Utilize their ideas. Enlist students to enlist other students; use a college student intern as the BSM liaison to the oldest students to convey the idea of it being cool. Communicate with potential participants via their preferred methods (e.g. MySpace).	# of individual schools, teachers, and individuals contacted. # of MySpace / networking "friends"
Provide credit Find ways to give academic, community service, or volunteer credits to participants.	# of credit programs organized; # of credits awarded.
Arrange volunteer sites Sites need to be convenient to BSM staff and to each participant.	# of volunteer slots arranged and filled.
Evaluation Front-end, process, and summative evaluation	
Concluding celebration All participants meet to celebrate and conclude the program.	

Services	Outputs (or counts)
Enlisting participants Volunteer Coordinator holds kick-off meetings at schools or home schooling sites.	 # of meetings # of participants attending
Organizing meetings Student participants are engaged in design so as to make it their own.	 # of participants.
Concept and demonstration training Groups meet at BSM for training in concepts and in effective delivery of demonstrations	 # of design participants
Delivery of demonstrations at volunteer sites Participants deliver demonstrations of STEM concepts at home school and public school site	# in audiences # of schools, grades/classes, and sites involved # of participants delivering X # of demonstrations

V. Outcomes

Outcome 1: Participants learn about STEM concepts.

Indicator(s)	Applied to	Data Source	Data Interval	Target
# and % of participants who can select 3 STEM topics, and correctly name at least 3 key elements of each topic.	Participants attending at least 2 demonstration training sessions.	Short quizzes of participants at end of training sessions.	Immediately at end of training session	90%
# and % of participants who provide a demonstration with no incorrect information about the STEM topic.	All demonstrators	Questionnaire to on-site teachers	At end of program	75%

Outcome 2: Participants show interest in learning more about STEM topics.

Indicator(s)	Applied to	Data Source	Data Interval	Target
# and % of participants who attend more than the minimum training sessions and/or who receive training for demonstrations other than the ones they deliver.	All participants attending at least 1 training session	Attendance logs	At end of program	50%
# and % of participants who undertake at least one additional learning opportunity (reading a book, exploring websites, visiting STEM venues, taking part in a club, etc.) about STEM topics	All participants attending at least 1 training session	Survey	At end of program	50%

Outcome 3: Participants demonstrate an interest in pursuing STEM as a career choice.

Indicator(s)	**Applied to**	**Data Source**	**Data Interval**	**Target**
# and % of participants who report an intention of majoring in a STEM field	12th-grade participants	Interview	At end of program	30%
# and % of participants who list at least one STEM-related job interest	All but 12th grade participants	Survey question about career goals	At end of program	50%

The Student STEM Demonstration Volunteer Study was based upon a project proposed by Linda Deck at the Los Alamos National Laboratory. For more information about the Los Alamos National Laboratory, visit: http://www.lanl.gov/museum/