

ResearchLink
Summative Evaluation Report

Prepared for



by:

Anne Sinkey, Barry Walther, and Liz Rosino

OMSI Engagement Research and Advancement Division

September 2014

with the generous support of



This material is based upon work supported by the National Science Foundation under grant Numbers DRL-1241331 and DRL-1241353. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Table of Contents

ACKNOWLEDGEMENTS.....	2
EXECUTIVE SUMMARY	3
INTRODUCTION	6
Project Background.....	6
Project Goals	7
METHODS.....	9
Onsite: Facilitated Museum Activities	10
Offsite: Science Café	12
Offsite: Community Events	13
<i>Science Buzz</i> Website	13
Data Analysis.....	14
Limitations	15
STUDY PARTICIPANT DEMOGRAPHICS	15
FINDINGS.....	18
Goal 1: Engagement and Interest	18
Goal 2: Awareness and Knowledge.....	23
Goal 3: Project Reach.....	27
SUMMARY	29
DISCUSSION.....	32
Success: Facilitating Engaging Learning Experiences.....	32
Areas for Growth: Attention to Venue and Emphasizing the Local.....	33
REFERENCES.....	34
APPENDIX A. Visitor Engagement Framework.....	35
APPENDIX B. <i>ResearchLink</i> Observation Sheet	37
APPENDIX C. <i>ResearchLink</i> Visitor Interview/Survey Instrument.....	38
APPENDIX D. Science Café Survey.....	41
APPENDIX E. Frequency and Examples of Observed Behaviors.....	43
APPENDIX F: Facilitated Activities at OMSI--Dates, Duration, and Reach	44
APPENDIX G: Community Event Reach Numbers	50

ACKNOWLEDGEMENTS

A special thanks to Dr. Carl Wamser and the rest of the scientists and researchers at Portland State University who were involved in this project. Thanks to Lauren Russell, Sean Rooney, Sue Wu, and the OMSI education staff for their project leadership, input and assistance with this evaluation. Finally, thanks to Melissa Laurie for her early evaluation work on this project, as well as the many OMSI data collectors whose hard work was pivotal to this study.

EXECUTIVE SUMMARY

Overview

The National Science Foundation (NSF) awarded funding to the Oregon Museum of Science and Industry (OMSI) and Portland State University (PSU) in Portland, Oregon to support a “Connecting Researchers and Public Audiences” (CRPA) project titled *ResearchLink: Spotlight on Solar Technologies*. The primary goals of CRPA projects are to communicate to the public about specific NSF research projects. This *ResearchLink* project promoted public awareness of two NSF-funded projects led by Dr. Carl Wamser at PSU, *Integrating Green Roofs and Photovoltaic Arrays for Energy Management and Optimization of Multiple Functionalities* and *Nanofibrous Conductive Polymers from Aminophenylporphyrins: Mechanisms for Conductivity and Applications in Solar Cells*. Through development of facilitated activities onsite at OMSI, offsite outreach at fairs and Science Café events, and creation of research-related content on the popular *Science Buzz* website, the *ResearchLink* project sought to increase the public’s interest, engagement, awareness, and knowledge of NSF-funded solar energy research and green roof technologies.

The summative evaluation was designed to assess the extent to which the *ResearchLink* program activities have achieved their intended goals of increasing public participants’ engagement and awareness related to the research presented.

Methods

A total of 286 individuals were observed, interviewed, and/or surveyed during data collection for this evaluation. Onsite at OMSI, 82 museum visitors were observed and 78 others completed a survey and interview. An additional 126 participants completed surveys at Science Café events offsite. In addition, numbers of participants were gathered from OMSI visitors, outreach community events including Science Cafés, and through internet traffic to the *Science Buzz* website. Data collection occurred from fall 2013 through summer 2014.

Project Goals

Goal 1: Engagement and Interest

To what extent and in what ways were public participants engaged and interested in the research being presented?

- a) Were participants engaged and satisfied with the activities?
- b) Were participants interested in the content?

Goal 2: Awareness and Knowledge

To what extent and in what ways did participants increase their awareness of and knowledge related to the research being presented?

- a) Did participants gain knowledge about the science concepts presented?
- b) Were participants aware that the presenters/facilitators were scientists and that the research was happening locally?

Goal 3: Project Reach

To what extent and in what ways were public audiences reached throughout the project?

Summary of Findings

Participant Engagement and Interest

Overall, participants in facilitated activities at OMSI and demonstrations at Science Café events were highly satisfied with their experiences. A full 97% of OMSI respondents found their experience valuable or interesting, while Science Café attendees rated their satisfaction 6.4 on a scale of 1-7 (with 7 as *completely satisfied*). Visitors noted the interactive, accessible experience with the scientist as highly valued, as well as the scientific and/or technological content of the activities.

Participant Awareness and Knowledge

Both onsite and offsite activities were highly effective at increasing participants' understanding of related scientific content. Through survey and interview data, a full 100% of offsite Science Café and 90% of onsite OMSI respondents reported learning something new from the experience, with Science Café participants reporting a 76% increase in knowledge of the research area after their experience. Most participants relayed detailed, specific information about scientific concepts, technological developments, and practical applications of the research presented. Visitors indicated greatly increased interest in learning more about the research after their participation in facilitated activities or demonstrations. Many also integrated the content by connecting it to past experiences, existing knowledge, or future plans. However, most participants did not report awareness that the facilitators/presenters with whom they interacted were local scientists talking about local research; those who were aware that their interaction was with local scientists positively valued such an interaction.

Project Reach

The *ResearchLink* project anticipated reaching a large number and variety of audiences through targeted onsite activities at OMSI, offsite community events including Science Café demonstrations, and through the *Science Buzz* website. As one of the goals of the project, specific targets were established to provide measures of success. Among the total number of participants—or reach numbers—for onsite, offsite, and online deliverables, the actual numbers exceeded the targets in nearly every case. Although the number of verifiable page views for the website did not quite meet expectations, reach numbers were exceeded by 75% for onsite facilitated activities, 25% for offsite Science Café demonstrations, and 11% for other community events.

Conclusion

The intention of the *ResearchLink* project was to strengthen public audiences' engagement, interest, awareness, and knowledge related to two NSF-funded research projects at PSU through dialogue-focused face-to-face interactions between scientists, OMSI educators, and the public. Given the findings of this evaluation, the PSU-OMSI collaboration was highly effective in achieving this deliverable. Overall, public participants expressed having a positive experience with *ResearchLink* programs and activities. Not only were visitor experiences successfully engaging and interesting; they were effectively instructive as well. In addition, nearly each aspect of the *ResearchLink* project deliverables—from onsite activities to offsite demonstrations—drew more public participants than originally anticipated. This level of public engagement multiplied the impact of *ResearchLink*, introducing more people in more places to current

local research in solar energy and green roofs and buildings. While our data suggest that the project may have been even more effective by making small changes to activity venues and further emphasizing the local aspects of this research, overall these findings indicate that the *ResearchLink* activities were effective both in relaying information about key scientific concepts as well as in situating these concepts in a relevant and complex context that was accessible and pertinent to public participants' lives.

INTRODUCTION

Project Background

Portland State University (PSU), in collaboration with the Oregon Museum of Science and Industry (OMSI), received funding from the National Science Foundation (NSF) to support a “Connecting Researchers and Public Audiences” (CRPA) project titled *ResearchLink: Spotlight on Solar Technologies*. CRPA is one of five categories of projects funded by the NSF to support informal science education programs that promote lifelong learning of science, technology, engineering, and math (STEM) through various contexts and institutional settings. The goal of the *ResearchLink* project was to engage public audiences and increase their awareness of two NSF-funded research projects at PSU related to solar energy and green roofs and buildings. *ResearchLink* developed a series of mechanisms by which PSU scientists worked collaboratively with OMSI staff to bring their ongoing research to the public through a variety of ways to reach a large number of people, including facilitated activities at the museum, off-site outreach programs, and a project website.

The Pacific Northwest has distinguished itself as a leader in innovative scientific and technological research that responds to the global energy crisis. This regional leadership in sustainable energy will continue to create industry-related jobs—perhaps as many as one million new jobs by 2020 (Pacific Coast Collaborative 2012). However, with declining rates of entry into the science and engineering workforce (NSF 2011), the region may have difficulty filling these new job opportunities. In response to this need, OMSI and PSU built on their history of successful collaborations to create educational content and experiences relevant to local, cutting-edge green energy research currently being developed at PSU and in the region. Specifically, research involving photovoltaic and green roof technologies was targeted as especially relevant, innovative, and of potential interest to the general public.



Figure 1. PSU Photovoltaic Test Facility

The *ResearchLink* project promoted public awareness of two NSF-funded research projects led by Dr. Carl Wamser at Portland State University (PSU), *Integrating Green Roofs and Photovoltaic Arrays for Energy Management and Optimization of Multiple Functionalities* and *Nanofibrous Conductive Polymers from Aminophenylporphyrins: Mechanisms for Conductivity and Applications in Solar Cells*. These projects provide key examples of innovation in a green technology product or system which, if developed and scaled to industrial production, hold the promise of leading to widespread, global implementation and availability to consumers.

OMSI educators worked collaboratively with PSU scientists to develop facilitated activities onsite at the museum, outreach community events including Science Cafés, and project-related content on the popular *Science Buzz* educational website that relayed aspects of their ongoing scientific research to a wider public audience in an accessible and meaningful way.

Project Goals

The summative evaluation was designed to assess the extent to which the *ResearchLink* program activities have achieved their goals of reaching a large number of people and increasing engagement, interest, and awareness related to the research presented. Measures of success were developed collaboratively with the project team to guide the evaluation and data collection activities. Facilitated activities onsite at OMSI and the demonstrations offsite at the Science Cafés were selected as prime locations to collect data about engagement, interest, and awareness among attendees. The onsite activities and Science Café demonstrations provided opportunities to gather data specifically related to face-to-face interactions between the public, OMSI educators and PSU scientists. In addition, total numbers of participants, or reach numbers, were collected across all of the project deliverables.

Goal 1: Engagement and Interest

To what extent and in what ways were public participants engaged and interested in the research being presented?

- a) Were participants engaged and satisfied with the activities?
- b) Were participants interested in the content?

Measures of Success:

- a) At least 80% of surveyed museum visitors and Science Café attendees agree or strongly agree that they were interested in and intrigued by the research being presented.
- b) At least 80% of observed museum visitors who attend a facilitated activity demonstrate initiation or transition learning behaviors such as doing the activity or expressing positive emotional response in reaction to their engagement.

Goal 2: Awareness and Knowledge

To what extent and in what ways did participants increase their awareness of and knowledge related to the research being presented?

- a) Did participants gain knowledge about the science concepts presented?
- b) Were participants aware that the presenters/facilitators were scientists and that the research was happening locally?

Measures of Success:

- a) At least 75% of surveyed museum visitors and Science Café attendees report learning a new concept about the research presented, and at least 75% of observed museum visitors who participate in a facilitated activity demonstrate breakthrough learning behaviors during their participation, such as making connections, referring to past experiences, or asking questions.
- b) At least 70% of museum visitors who interact face-to-face with a scientist are aware that the facilitator was a scientist and that the research was happening locally.

Goal 3: Project Reach

To what extent and in what ways were public audiences reached throughout the project?

Measures of Success:

- a) At least 5,000 museum visitors participate in facilitated activities at OMSI.
- b) At least 300 visitors attending outreach community events interact with activities created by PSU scientists.
- c) At least 400 people will attend the two *ResearchLink* Science Cafés.
- d) At least 1,000 page views will be recorded for the *ResearchLink*-related Science Buzz [web pages](#).

METHODS

A total of three different methods of data collection were utilized in this study to measure the impact and reach of the project: observation, survey, and interview.

To measure the project's impact on the public's engagement, interest, and awareness, 286 individuals were observed, interviewed, and/or surveyed. Onsite at OMSI, during or after their participation with at least one of the facilitated activities, 82 youth and adult museum visitors were observed, and 78 adults completed a combined survey/interview. An additional 126 adults completed surveys after attending an offsite Science Café event. None of the participants were involved in more than one data collection method. Data collection utilizing these three methods occurred during October 2013 and from January through March 2014.

Table 1. Number of subjects participating in data collection by method

	Offsite Science Café	Onsite OMSI educator-led facilitated activities	Onsite PSU scientist-led facilitated activities	Total
Observations	-	50	32	82 (29%)
Combined interview and survey	-	58	20	78 (27%)
Survey only	126	-	-	126 (44%)
Total	126	108	52	286

In addition to these data collection methods, the total number of participants (reach numbers) was recorded in all aspects of the project: onsite at OMSI, offsite at Science Cafés and other community events, and through the *Science Buzz* website. Reach numbers were collected from February 2013 through August 2014. While most participants did not complete a survey or interview, the numbers illustrate the extent to which project activities engaged a wide audience.

Table 2. Number of visitors reached across all *ResearchLink* events and activities

	Total number of participants reached
Onsite OMSI facilitated activities	8,750
Offsite Science Café events	498
Offsite community events	333
<i>Science Buzz</i> website	710
Total	10,291

Details about methods for obtaining these numbers and other data collection activities follow below.

Onsite: Facilitated Museum Activities

Under this project, two types of facilitated activities and demonstrations were developed for use onsite at OMSI. First, a group of graduate student researchers collaborated with Dr. Wamser at PSU to develop a set of nine activities specifically focused on aspects of their research with support from OMSI education staff. Of the nine activities initially developed by PSU scientists and OMSI educators, each demonstrated an aspect of these local scientists' work related to solar energy, solar panels, and green roofs using a variety of props and displays specifically designed to engage visitors. PSU scientists facilitated activities at OMSI during a set of six pilot program days in spring 2013. The scientists continued to facilitate these programs at OMSI's *Meet a Scientist* monthly program, held on the second Saturday of each month, beginning in fall 2013.



Figure 2. PSU scientist describes a solar cell to youth during an activity at OMSI

Second, selections from the scientists' activities were developed to become permanent educational offerings at OMSI. OMSI educators worked with PSU scientists to make the activity materials more robust so that they can be facilitated on an ongoing basis by OMSI museum educators and volunteers and integrated into OMSI's traveling programs to reach rural audiences. In addition, these activities and related materials were translated to be bilingual (Spanish/English). The two projects selected for development into facilitated activities were:

- *Solar Data*: Based on the environment of PSU's photovoltaic (PV) and green roof test facility, this activity invites participants to manipulate light and temperature variables to test the impacts on solar electricity output. Visitors then apply what they learn to data graphs from PSU's test facility to interpret project results.
- *Dyeing Light*: This tabletop exhibit teaches visitors the science behind dye-sensitized solar cell technology and explores the question of whether certain dyes are more effective at absorbing sunlight and converting it to electrical energy.

During OMSI's \$2 Sundays (a program through which OMSI offers \$2 general admission to its exhibits during the first Sunday of each month), OMSI educators facilitated these and other activities with families and visitors on the museum floor. The exact dates, duration, number of educators present, and number of activities/tables utilized are included in Appendix F. Observations, interviews, and surveys were conducted on days when facilitated activities were offered.

Location

Facilitated activity materials and props were set up on tables, usually inside the Earth Hall at OMSI. The tables were most often placed in front of the Paleontology and Watershed Labs in the Earth Hall, which allowed them to face the center of the Earth Hall. This location was chosen as it is an area of high foot traffic within the exhibit hall and adjacent to complementary content in an existing exhibit on solar, wind, and wave sources of renewable energy.

Exhibit Display and Signage

Typically, two tables were set up during each day of data collection. During *Meet a Scientist* Saturday events, special event pop-up banners were set up near the tables.

Additionally, two 8.5" X 11" signs in floor stands were placed near the tables to notify museum visitors that a study was being conducted on dates when data were collected. These signs both provided passive informed consent information about the study and brought more attention to the activities at the exhibit tables. In the Earth Hall, this sign was positioned near the front of the tables; a secondary sign was posted on a column behind the tables. In the hallway, one sign was positioned directly in front of one of the tables while the second sign was posted on a handrail behind the tables.



Figure 3. PSU scientist describes activity to youth at OMSI



Figure 4. PSU scientist facilitates an activity with visitors at OMSI

Facilitators

All of the facilitated activities involved opportunities for hands-on interaction with museum visitors. During the monthly *Meet a Scientist* Saturdays, PSU scientists facilitated activities with museum visitors at OMSI. One OMSI science educator staff member would help the scientists with setting up their tables. On \$2 Sundays and some other high-traffic days, one or two OMSI educators, rather than PSU scientists, facilitated activities with visitors. These educators had been specifically trained in presenting PSU scientists' research and facilitating activities related to the research.

Presentation

Tables were usually set up between 11:00 a.m. and 12:00 p.m. and were taken down at 4:30 p.m. Visitor interaction with the facilitated activities was busiest before noon and between 1:00 p.m. and 4:00 p.m. Although visitation often waned after 4:00 p.m., visitors' length of time spent and depth of involvement with the activities often increased during such times of slower traffic.

Data Collectors

Two OMSI evaluators collected data during all but one of the weekend days, when only one evaluator was available. Each evaluator would have an assigned role: one evaluator performed observations, while the other evaluator selected individuals and conducted an interview and a survey after that individual's/group's interaction with the facilitated activity.

Observation of Youth and Adults

The systematic observations focused on the length of time visitors spent at the activities and if they demonstrated specific behaviors that indicated learning and engagement. The list of behaviors was informed by the Visitor Engagement Framework developed by Chantal Barriault that establishes a method of categorizing learning behaviors at science centers (Barriault 1999). The framework consists of a list of discrete learning behaviors that occur as part of a visitor's interaction with an exhibit. The

learning behaviors can be grouped into three categories (initiation, transition, and breakthrough) that reflect increasing levels of engagement and depth of the learning experience, such as observing the activity or verbalizing personal connections. These behaviors and levels were then adapted for this project to suit the nature of hands-on facilitated learning experiences. (See Appendix A for more information about the framework.)

The evaluator observed the first individual (youth ages 8–17 or adult age 18 or older, depending upon target) that approached and interacted with the activity for at least 45 seconds. If a group approached, the evaluator selected the first group member to arrive at the activity table. The evaluators positioned themselves close enough to watch and overhear the activities happening, but far enough to neither interfere nor distract from the activity. Data were recorded on a standardized observation sheet. (See Appendix B for the observation sheet.)

Surveys and Interviews of Adults

After a randomly-selected adult finished interacting with the activity, the evaluator approached and asked if they would be interested in participating in a short interview and survey about their experience with the activity. The data collector outlined the purpose, how the information would be used, and asked if they agreed to participate. After finishing, the data collector thanked the participant and returned back to the activity to interview and survey the next available subject. (See Appendix C for the interview and survey instruments.)

Collection of Reach Numbers

Reach numbers were collected for facilitated activities at OMSI by conducting sample visitor counts for all people who approached an activity. During 57 separate half-hour periods, OMSI educators conducted these sample reach counts by noting each person who approached and interacted with any of the activities on the floor at that time. These sample counts provided a glimpse into the overall number of participants reached through the project. The overall estimated participant count, or reach number, was calculated by averaging these sample numbers to calculate an average reach count per hour (35), and then multiplying this number by the total number of hours that activities were provided on the museum floor (250) to estimate a total reach number of 8,750 people. (See Appendix F for the sample count results for each half-hour period, as well as the dates and duration for each day of activities.)

Offsite: Science Café

Science Café events are sponsored by OMSI and hosted offsite by a local theater-pub, such as Portland's Mission Theater, during weeknights throughout the year. These events involve a presentation on a science- or technology-related topic in an informal environment. Two Science Cafés with scientists from PSU were developed as part of the *ResearchLink* project. The first, *Artificial Photosynthesis: Learning from Nature's Solar Energy Strategies*, was hosted on February 19, 2013 with Dr. Carl Wamser, professor of chemistry at PSU. The second, *The Wonderful World of Moss!*, was hosted on October 15, 2013 with Dr. Todd Rosenstiel, associate professor of biology at PSU.

Data were collected about participant engagement, interest, and awareness during the October Science Café event in the form of a written survey. (See Appendix D for the survey instrument.) Prior to the

event, the survey was distributed across all seats in the venue with a writing utensil and a request to complete the survey after the event was finished. Prior to the researcher's presentation, the event MC reminded participants about the survey and provided instructions on the drop-off location. Participants were asked to return completed surveys to a designated location at the conclusion of the program. A total of 198 adults were in attendance at this event, and 126 (64%) returned the survey. An incentive was offered to participants to encourage their participation. Each survey completed was entered into a raffle drawing to win four free passes to an OMSI special exhibit.

Reach numbers were collected by gathering the attendance records at the two events as provided by the hosting facility to the OMSI events staff. As noted above, 198 adults attended the Science Café, *The Wonderful World of Moss!*, with Dr. Rosenstiel in October 2013. In addition, the Science Café held in February of 2013, *Artificial Photosynthesis: Learning from Nature's Solar Energy Strategies* with Dr. Wamser, drew 300 attendees. All Science Café survey respondents were adults.

Offsite: Community Events

These facilitated activities developed in partnership with OMSI educators and PSU scientists were used to create stand-alone activities that involved interactive components but did not require facilitation by a scientist or educator. These activities were provided to adult and youth attendees as part of OMSI's table or booth offerings at fairs and festivals. During summer 2014, four community events drew visitors to engage with OMSI tabletop exhibits: the Hermiston Fun Fest street fair, the Longview Science Festival, the Forest Grove Library Science Festival, and the Wasco County Fair. Among these four community events, outreach staff estimated that a combined 1,000 visitors approached and engaged with OMSI tabletop exhibits and activities. Since the *ResearchLink* content was often one of several tabletop options available to visitors, outreach staff conservatively estimated that one out of three of these visitors engaged specifically with *ResearchLink* material, for an estimate of 333 total visitors reached by *ResearchLink* materials. (See Appendix G for approximate reach numbers for each event.)

Due to the nature of these events, as well as the scope of the *ResearchLink* project and capacity of evaluators, surveys, interviews, and observations were not conducted during these events. Given that the activities offered were not always facilitated and did not necessarily provide the face-to-face interaction which lies at the heart of this project, it was determined that reach data were the most appropriate type of data to be collected at community events.

Science Buzz Website

Science Buzz is an NSF-funded online research-to-public platform developed by the Science Museum of Minnesota (SMM) and led by Liza Pryor of SMM, who also serves as a *ResearchLink* advisor. It is accessible through the *Science Buzz* online portal, www.sciencebuzz.org, which is available in schools, rural libraries, and homes nationwide, in addition to being available through kiosks at science centers across the country. As part of the effort to reach a wide public audience, including rural audiences, *ResearchLink* worked with PSU scientists to upload content related to their work on solar energy to the *Science Buzz* website. This included a customized home page for the *ResearchLink* project using the *Science Buzz* software template and short videos that highlighted the scientists' research in visually

appealing and accessible ways. *Science Buzz* enabled the work of PSU scientists to be shared with audiences beyond the Portland area; in addition, this content was accessible through a kiosk in the OMSI Earth Hall throughout the duration of the project and afterwards.

Colleagues at SMM used Google Analytics to record data for the number of visitors that accessed specific *ResearchLink*-related webpages through the SMM *Science Buzz* website. According to Google Analytics, from June 1, 2013 to August 31, 2014, the five webpages related to PSU scientists' research received a total of 710 page views, of which 374 were unique. The average visit was one minute thirty-five seconds in duration.

Table 3. Number of internet visitors to PSU scientist-related web pages via *Science Buzz* website, June 1, 2013–August 31, 2014

Web page	Page views	Unique views	Average duration
<i>Science in Action</i> http://www.sciencebuzz.org/topics/science-action-1	233	113	0:54
<i>Green Roofs + Solar Panels = Better Together?</i> http://www.sciencebuzz.org/topics/green-roofs-solar-panels-better-together	169	85	1:21
<i>Solar Cells with Organic Dyes: Cheaper, Cleaner</i> http://www.sciencebuzz.org/topics/solar-cells-organic-dyes-cheaper-cleaner	163	101	1:52
<i>Why Solar Energy?</i> http://www.sciencebuzz.org/topics/why-solar-energy	105	62	3:02
<i>Meet a Scientist</i> http://www.sciencebuzz.org/topics/meet-scientist	40	13	0:44
Total	710	374	1:35

While the above numbers only reflect internet traffic to these webpages through the main *Science Buzz* website, *ResearchLink*-related webpages were also accessible through a kiosk centrally located in OMSI's Earth Hall. Through this kiosk, visitors could easily access the webpages and watch videos about PSU scientists' research. Unfortunately, exact numbers for visits to the *Science Buzz* website via the kiosk located within the OMSI building are unavailable due to a technical problem. However, the OMSI kiosk was open and accessible for the duration of this project. Early page view counts and observations of visitors at the kiosk suggest that these webpages were accessed much more often through the OMSI kiosk than through the *Science Buzz* website from SMM. Therefore, it is likely that the actual number of page views is much higher than the numbers above might indicate, even though the SMM Google Analytics provides our only available data.

Data Analysis

Quantitative data were entered into Excel or SPSS software and double-checked for accuracy before undergoing analysis to determine frequencies and percentages. Open-ended data were entered into

Excel and inductively analyzed to determine commonly occurring themes. A code list of themes was developed and one or more codes were applied to each response. A second evaluator reviewed the code list and application of codes to uncover discrepancies and further refine codes to ensure that responses reflected respondents' intentions as much as possible. Once codes were finalized, frequencies and percentages of codes were determined to offer insight into quantitative data, and representative examples of responses were selected to illustrate relevant themes in this report.

Limitations

Observation data of visitors to the onsite facilitated activities at OMSI included both youth and adults. Adult visitors to OMSI commonly stand back and allow their children/dependents to take the lead in interacting with exhibits and related activities. Therefore, the most active participants in facilitated activities were youth. Since survey and interview data at OMSI was only collected from adults, this data may not accurately portray the extent of interaction and depth of learning that occurred among all participants—both youth and adult. Discrepancies between the observation data and the survey/interview data might be attributed to this limitation.

Survey, interview, and observation data were collected in situations and locations where dialogue and meaningful face-to-face interactions between scientists, OMSI educators and members of the public were likely to occur. This led evaluators to focus on the facilitated activities at OMSI and the demonstrations offsite at Science Café events. As outlined in the project plan, data collected at offsite fairs, and via the project-related webpages was limited to participant, or reach, numbers. Thus, while this report covers all aspects of the project, survey and interview data were only collected from select locations and events related to the project. Finally, as mentioned earlier, unforeseen technical complications prevented the collection of complete accurate reach data for *Science Buzz* webpages accessed through the OMSI kiosk.

STUDY PARTICIPANT DEMOGRAPHICS

Demographic information was collected from participants at the OMSI facilitated activities and at the Science Café event. This data reflect participants who were involved in observation, survey, or interview data collection methods. Of these participants, slightly more than a half (54%) of participants in data collection were female. The overall percentage of females at the Science Café was slightly higher (57%) than the percentage of females at OMSI facilitated activities (52%).

Table 4. Participant Gender by Location

	Onsite: OMSI (n=160)	Offsite: Science Café (n=126)	Total (n=286)
Male	47% (n=75)	32% (n=40)	40% (n=115)
Female	52% (n=83)	57% (n=72)	54% (n=155)
Undetermined	1% (n=2)	11% (n=14)	6% (n=16)

Data collectors recorded approximate ages for youth and adults who were observed during facilitated activities at OMSI. In addition, age data were requested from adult facilitated activity participants at OMSI and from adult attendees at the offsite Science Café demonstration.

Table 5. Participant age by location

	Onsite: OMSI (n=160)	Offsite: Science Café (n=126)	Total (n=286)
8–11	21% (n=34)	n/a	12% (n=34)
12–14	5% (n=8)	n/a	3% (n=8)
15–17	<1% (n=1)	n/a	<1% (n=1)
18–29	24% (n=39)	35% (n=44)	29% (n=83)
30–50	39% (n=62)	33% (n=42)	36% (n=104)
51–65	6% (n=10)	14% (n=18)	10% (n=28)
66+	3% (n=5)	9% (n=11)	6% (n=16)
Undetermined	<1% (n=1)	9% (n=11)	4% (n=12)

The most common (36%) ages of participants at OMSI and the Science Café were between 30 and 50. The second most common age range of participants was 18–29, with 29% of participants in this category.

Among participants who took part in facilitated activities onsite at OMSI, 17% (n=13) were OMSI members. Almost all of these respondents were not alone, but were visiting as part of a group (94%), typically containing adults and children (69%). For many, this was their first visit to the museum (33%, n=26); many others reported only occasionally visiting the museum (30%, n=23). Over a third of these participants (37%) work in a science, technology, engineering, or math (STEM) related career, and overall their average rating of an interest in science on a scale of one (not interested) to five (very interested) was a four.

Table 6. OMSI membership, visit frequency, and group type among OMSI facilitated activity participants

OMSI member	Yes	No	Unknown
	17% (n=13)	74% (n=58)	9% (n=7)

Visiting group type	Alone adult	Group of adults (no children)	Adult(s) + child(ren)
	6% (n=5)	24% (n=19)	69% (n=54)

OMSI visit frequency	First visit	(Rarely) Less than once a year	(Occasionally) 1–3 times a year	(Regularly) 4 or more times per year	Unknown
	33% (n=26)	28% (n=22)	30% (n=23)	8% (n=6)	1% (n=1)

Demographic information was not collected for visitors at offsite community events (excluding Science Cafés) or for those who accessed content on the *Science Buzz* website, but reach numbers for these portions of the project are discussed above in the Methods section of this report.

FINDINGS

Goal 1: Engagement and Interest

To what extent and in what ways were public participants engaged and interested in the research being presented?

a) Were participants engaged and satisfied with the activities?

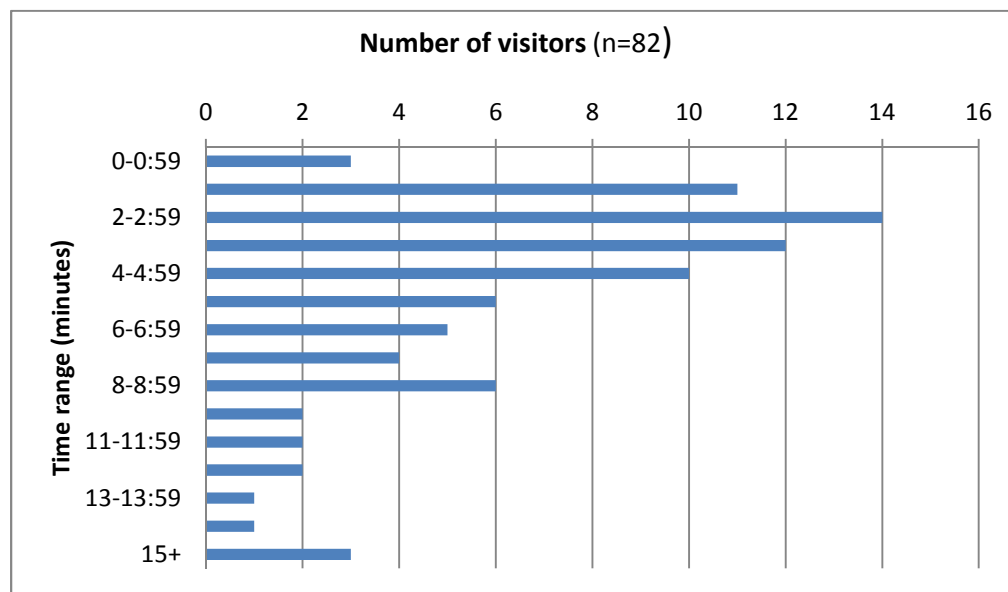
b) Were participants interested in the content?

To measure visitor engagement and satisfaction, quantitative data were collected on the amount of time visitors spent at facilitated activities onsite at OMSI, as well as data about the types of behaviors exhibited by visitors while at the activity. In addition, OMSI visitors were asked via survey and/or interview about how satisfied they were with the experience, and how valuable they found the activities. Science Café attendees were also surveyed about their satisfaction with their experience offsite at the Science Café event.

Time Spent

Observations were made of visitors who approached a facilitated activity while at OMSI. Visitors spent a mean of five minutes and thirty-one seconds (5:31) at a facilitated activity, with a median time of four minutes and sixteen seconds (4:16). The shortest time recorded was forty-five seconds (:45) while the longest time was over a half hour: thirty-four minutes and ten seconds (34:10). Visitors who left the area of the activity before forty-five seconds were not considered to have interacted with the activity and were thus not counted in observation data.

Chart 1. Time spent at facilitated activity, OMSI visitors



Most visitors stayed with the facilitated activity for several minutes, which indicates that they found the activities presented by facilitators—PSU scientists and OMSI educators—interesting and/or engaging.

Other Engagement Behaviors

In addition to recording the duration of time visitors spent at each activity, data collectors observed both adult and child visitors by looking for any of ten different behaviors that indicate engagement and learning (see Appendix A). This list of ten behaviors was adapted from Barriault’s Visitor Engagement Framework. These behaviors are grouped into three categories: initiation, transition, and breakthrough. Each of the ten behaviors indicates increased depth and level of engagement and learning, from simply observing others who are participating, to deep, significant interaction evidenced by behavior such as detailed discussion or repetition of the learning activity. The more behaviors a visitor exhibits, the more engaged they are with the activity and learning experience.

Out of all ten behaviors, the mean number of behaviors observed per visitor was 4.48, with a median of four. With one exception, all observed visitors demonstrated at least one *initiation behavior*, most commonly observing and watching with interest. In addition, 72% demonstrated at least one *transition behavior*, most commonly showing a positive emotional response and signs of enjoyment. More than 57% of observed visitors demonstrated *breakthrough behaviors*, most commonly by seeking information through asking questions or verbalizing connections about concepts within the activity. (See Appendix E for examples of the specific behaviors observed by evaluation staff while on the museum floor.)

Table 7. Frequency of observed engagement and learning behaviors during facilitated activities (n=82)

Engagement and learning behaviors	# of visitors	% of visitors
Initiation behaviors		
Observes	75	91%
Physically participates	66	80%
Answers simple question	56	68%
Total demonstrating at least one initiation behavior	81	99%
Transition behaviors		
Positive emotional response	50	61%
More engaged in activity	34	41%
Total demonstrating at least one transition behavior	59	72%
Breakthrough behaviors		
Seeks information	24	29%
Verbalizes connections within the activity	21	26%
Shares information	15	18%
Refers to past experiences	8	10%

Deeply engaged and involved	18	22%
Total demonstrating at least one breakthrough behavior	47	57%

This observation data indicate that the majority of visitors who approached the facilitated activities at OMSI showed a positive emotional response and engaged with the facilitator through some sort of verbal interaction. In addition, this level of engagement occurred in the context of relatively heavy visitation at each activity: the average number of people reached per facilitator per hour was 20.5.

Visitor Satisfaction

Engagement and satisfaction among OMSI visitors were mirrored by survey data as well. On a scale from one to five (with five being *great*), visitors were asked to rate different aspects of the facilitated on-site activities. Overall, visitors rated the experience highly: the mean rating was 4.5 or higher across each aspect of experience.

Table 8. Visitor satisfaction ratings of the facilitated activities (1=poor to 5=great)

Aspects of the experience	% giving a rating of 3 or higher	Mean rating
Activity was Fun (n=66)	100%	4.5
Activity was Clear (n=66)	99%	4.6
Activity had a Good Topic (n=66)	100%	4.8

Out of sixty-six participants in the survey, all sixty-six of them replied *OK*, *Good*, or *Great* in response to a question about how fun they found the activity.

Qualitative data in the form of open-ended responses to interview questions support this finding. OMSI visitors were asked by interviewers how, if at all, their experience with the facilitated activities had been valuable to them. Out of seventy-eight respondents to this question, seventy-six (97%) indicated that the experience had been valuable or interesting to them. Responses were analyzed and separated into common themes, or codes. While the most common types of responses were generally positive without providing any specific reason (31%, n=24), the second most common type of response (24%, n=19) had to do with the scientist or educator's ability to be engaging, relatable, or provide an interactive experience. Visitor responses included:

"It's really neat to see scientists out in the world working on these kinds of things. Helps to show kids that there are these kinds of jobs out there."

"There's lots of interactive stuff, but there's something to be said for an interesting person."

"It was very good to have a scientist here. It was great that it was hands-on. The scientist was really able to bring the content down to a kid's level."

Levels of visitor satisfaction with the scientists' demonstrations at the offsite Science Café mirrored those at OMSI: on a scale from one to seven (with seven being *completely satisfied*), visitors were asked to rate their level of satisfaction of the Science Café. Overall, visitors rated the experience highly: the

mean rating was 6.4. A large margin (87%) rated their overall satisfaction as six or seven, indicating near-complete or complete satisfaction with the presentation.

These findings indicate that in general, participants in both OMSI facilitated activities and at the Science Café demonstrations developed as part of the *ResearchLink* project were very engaged and highly satisfied with their experiences.

Goal 1: Engagement and Interest

To what extent and in what ways were public participants engaged and interested in the research being presented?

a) Were participants engaged and satisfied with the activities?

b) Were participants interested in the content?

Building Interest

Participants were asked to rate the level of their interest in the scientific topics being addressed before and after their experiences with OMSI facilitated activities and at the Science Café. The findings show that participant interest increased as a result of their experiences among both onsite museum audiences and offsite Science Café participants. Indeed, the percentage of respondents at OMSI who rated their interest as three or higher (scale 1–5) jumped from 74% before participation to 99% after participation. Similarly, Science Café attendees' surveys showed an increase from 57% to 90% for those who rated interest in learning more at five or higher (scale 1–7). Participants in the facilitated activities at OMSI were asked whether their experience made them want to learn more about the research area, local or personal applications of the research, or local scientists working in the research area.

Table 9. OMSI facilitated activity participants wanting to learn more after the activity (1=strongly disagree to 5=strongly agree)

Wanting to learn more about...	% giving a rating of 3 or higher	% giving a rating of 4 or higher	Mean rating
This area of research (n=78)	96%	76%	4.1
Local or personal applications of this research (n=66)	99%	71%	4.1
Local scientists working in this research area (n=78)	95%	71%	4

Respondents showed most interest in learning more about the research area and applications of the research, followed by interest in learning more about local scientists working in the research area.

In addition to the participants onsite at OMSI, those who attended the scientists' demonstrations at the Science Café events also agreed that their experience made them want to learn more about the research. When asked specifically about what elements of the topic they would like to learn more about,

Science Café respondents mentioned scientific content most often (40%, n=48), followed by the applications and practical uses of the science (34%, n=41). Some examples included:

“It would be interesting to talk more about green roofs and how to accomplish this.”

“I would like to learn more about the medicinal and environmental path of moss cultivation.”

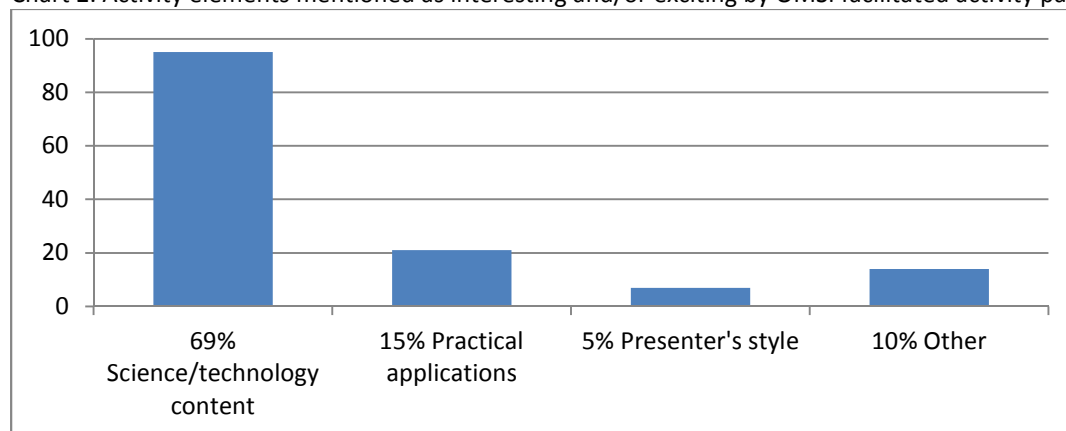
“How [do I] encourage moss growth in my yard? I want a moss lawn!”

Almost all (99%) of the visitors who participated in the on-site facilitated activities said that the experience added value to their visit that day. In addition, 80% of the visitors said that their experience with the onsite activities made them want to visit OMSI again.

Focus of interest

When asked about the most interesting or exciting thing visitors did or discovered during the tabletop exhibit demonstrations, the scientific or technological content of the demonstrations was the most commonly-mentioned item of interest, making up a total of 69% (n=95) of all types of items mentioned (n=137).

Chart 2. Activity elements mentioned as interesting and/or exciting by OMSI facilitated activity participants



Among mentions of science/technology content as the most interesting aspect of the experience, about 39% (n=53) were most interested in content related to the technology or technological objects, followed by scientific concepts/facts from the activity (31%, n=42). Specific details about the science in the demonstration and/or exhibit were present throughout participants' responses, indicating interest in the content at a very detailed level. In addition, positive emotion and enthusiasm were evident in a number of participant responses regarding their interest in the content of the demonstrations. Some responses included:

“The only thing I knew coming in was that moss had sperm. Everything else was new and interesting!”

“I liked the thermometer! I had never seen one like that before.”

“The fact that those itty bitsy cells produce so much power! I thought it would have taken one of those large solar panels to produce that much.”

Overall, both OMSI activity participants and Science Café attendees reported high levels of interest in the content presented. Respondents were able to articulate specific elements of the science and technology from these activities that they found interesting, and most reported increased interest in the content and research after participating in facilitated activities and demonstrations.

Goal 2: Awareness and Knowledge

To what extent and in what ways did participants increase their awareness of and knowledge related to the research being presented?

a) Did participants gain knowledge about the science concepts presented?

b) Were participants aware that the presenters/facilitators were scientists and that the research was happening locally?

While one goal of *ResearchLink* was to offer interesting learning experiences to participants, an additional goal was to effectively educate visitors about the scientific concepts at the core of the facilitated activities. Findings from both OMSI visitors and Science Café attendees show that this goal was achieved.

Table 10. Participants from OMSI facilitated activities and Science Café demonstrations who reported learning something new from the experience

	Learned something new
OMSI facilitated activity participants (n=137)	90% (n=127)
Science Café demonstration participants (n=89)	100% (n=89)
Combined mean (n=226)	96% (n=216)

Overall, 96% of participants in the OMSI facilitated activities and Science Café demonstrations reported learning something new through their experience.

All (100%, n=89) Science Café participants reported learning something new from the presentation/activity. Topics related to scientific content were mentioned most often when attendees listed what they had learned from the demonstration (52%, n=58). Respondents also mentioned the application of the scientific knowledge and its practical use (16%, n=18) as something new that they learned from the demonstration. Some of these responses included:

“Mosses are ancient and impressive plants. I’ve learned what makes mosses interesting and unique. Especially interesting is the research about mosses being used to genetically engineer antibodies and glycoproteins.”

“I learned a lot about moss. Age, characteristics, how they impact a landscape, how they reproduce.”

When asked whether they had learned anything new that they did not know before, the vast majority (90%) of OMSI facilitated activity participants agreed that they had learned new content through their experience. The majority (64%) of things mentioned by respondents related to the technological or scientific content of the activity. In addition, visitors’ responses related what they had learned to personal experience and/or prior knowledge 15% of the time. For example, some responses included:

“Yes, I did not know about how hot and cold could affect solar panels like that.”

“Yeah, the part that was new to me was that you can actually grow plants on your roof instead of using insulation. That and I didn’t realize before that ‘green roofs’ actually mean actual plants on the roof.”

“[I learned about] the effect of air temperature on the [solar] panels. I assumed direct sun in warmer regions like California and Arizona would be more efficient.”

Additional quantitative data reinforce the finding that facilitated activities were highly effective at increasing participants’ understanding of related scientific content. When asked to rate their level of understanding of the research area before and after participating in the facilitated activities, OMSI visitors increased from a mean rating of 2.7 (scale 1–5) to a mean of 4.2—an increase of 56%. Similarly, when asked to rate their level of knowledge about the research topic before and after the Science Café demonstration, participant responses increased from a mean rating of 2.6 (scale 1–7) to a mean of 4.5—an increase of 73%.

Table 11. Rate of increase in participant ratings of own understanding/knowledge of research area before and after participation

	Understanding/ knowledge before participation	Understanding/ knowledge after participation
OMSI facilitated activity participants (Scale 1–5)	2.7	4.2
Science Café demonstration participants (Scale 1–7)	2.6	4.5

Self-reported knowledge and understanding of material covered through facilitated activities onsite at OMSI and during offsite Science Café demonstrations increased among all respondents. The percentage of OMSI facilitated activity participants who rated their understanding of the research area as 3 or higher (1–5 scale with 5 indicating *great*) jumped from 61% before the activity to 100% after the activity.

Those who rated their understanding as a 4 or higher (*good or great*) jumped from 21% to 80% after the activity.

When asked how they would describe the demonstration/activity to a friend or relative, the majority (70%) of topics mentioned by OMSI facilitated activity participants related to scientific or technological content, with an additional 16% relaying topics about the practical applications of the information. In addition, over half (57%, n=47) of OMSI participants also demonstrated learning through verbalizing connections with past experiences and seeking or sharing information about the content of the activities. These findings, taken from observation data, confirm visitors' own verbal responses that show the scientific material's personal relevance to them, as well as integration of the content into past experiences and current knowledge.

Taken together, a full 95% of OMSI and Science Café respondents agreed that they had learned something new about science concepts through participation in the provided facilitated activities or demonstrations. Overall, these findings show that the *ResearchLink* project was extremely successful in providing visitors new knowledge about scientific content.

Goal 2: Awareness and Knowledge

To what extent and in what ways did participants increase their awareness of and knowledge related to the research being presented?

a) Did participants gain knowledge about the science concepts presented?

b) Were participants aware that the presenters/facilitators were scientists and that the research was happening locally?

Awareness of local scientists

Participants in activities facilitated by PSU scientists were surveyed after their interaction with the activities at OMSI. Among those OMSI respondents who interacted with one of the scientists on a *Meet a Scientist* Saturday event, 25% reported that they were aware that the people who facilitated the activities were local scientists, while 70% did not know, and 5% were unsure. Similarly, offsite Science Café participants were surveyed after the event with PSU scientists. Even fewer Science Café respondents were aware that the research was local: just 24% reported that they were aware, while 65% were unaware, and 11% were unsure.

Table 12. Participant awareness that activity facilitator/demonstrator was a local scientist after interaction/activity

	Aware	Unaware	Unsure
OMSI scientist-facilitated activity participants (n=20)	25% (n=5)	70% (n=14)	5% (n=1)
Science Café	24% (n=28)	65% (n=77)	11% (n=13)

participants (n=118)			
Total (n=138)	24% (n=33)	66% (n=91)	10% (n=14)

While most OMSI visitors (70%) and Science Café attendees (65%) did not report that they were aware that their facilitator/presenter was a local scientist, once they were made aware of this fact, the experience of interacting face-to-face with a local scientist was described as being valuable. Visitors to OMSI during the *Meet a Scientist* Saturday events were asked whether it had been valuable having a scientist or “expert” there to interact with them and/or their family. Of the OMSI respondents who interacted directly with one of the scientists (n=20), the majority (90%) specifically mentioned that they valued being face-to-face with a scientist. (The other two responses indicated that they had a positive experience but did not mention the scientists as part of their response.) As a result, 70% (n=14) of these respondents indicated that they agreed or strongly agreed that the experience made them want to know more about local scientists working in this research area.

These findings show that the chance to talk face-to-face with scientists was an important and valuable element of the overall experience for most of these respondents. For example:

“Big motivation to learn more. It’s not just the information but the feelings from the scientists.”

“It was very valuable having the scientist here to really explain and elaborate it.”

“It’s nice to have an actual scientist to talk to instead of just some person that works in an office. He helped make it relatable.”

“It was great. He explained it clearly, better than if I had just gone online and tried to learn about it myself.”

Among all respondents at OMSI and the Science Café, when asked what they found most interesting about their experiences, a handful of visitors (three out of 137) named the fact that this research was being done locally. Similarly, a few respondents (three out of 128) noted the fact that the research was local when asked how they would describe the demonstration to a friend or relative. Responses included:

“[The demonstration was about] experiments done by PSU to see if the energy is more efficient when panels were heated or cooled.”

“PSU research on heating and cooling....”

Also, the fact that the Science Café scientist demonstrator was a particular PSU faculty member is what drew a handful of visitors to the Science Café. When asked why they came to the event, eight respondents (8%) explicitly mentioned the scientist, PSU professor Dr. Todd Rosenstiel, as the main attraction. Sample responses included:

“My old professor was the main speaker!”

"I had Dr. Rosenstiel as a professor for cell Bio and thoroughly enjoyed his class. Besides, moss is cool!"

While the fact that facilitated activities and demonstrations involved research by local scientists may not have been at the forefront of many visitors' minds, a number of participants noted the applicability of the research to a local context. Of those who noted the fact that activities were facilitated by scientists, their reaction was positive. In addition, many visitors noted the approachability and engagement of the scientist as one of the most valuable elements of their experience.

Goal 3: Project Reach

To what extent and in what ways were public audiences reached throughout the project?

The *ResearchLink* project anticipated reaching a large number and variety of audiences through targeted onsite activities at OMSI, outreach community events including Science Cafés, and through the *Science Buzz* website. For onsite and offsite audiences, the actual reach of the project exceeded almost all expectations. Specific details about the methods used for calculating reach numbers can be found in the methods section of this report.

Onsite: OMSI Facilitated Activities

The facilitated activities prepared for OMSI public audiences, including *Meet a Scientist* Saturday and \$2 Sunday events, reached an estimated 8,750 visitors. An estimated 4,393 visitors participated in the facilitated activity, *Dyeing Light*, and approximately 2,993 visitors interacted with the activity *Solar Data*. In addition, 1,365 visitors interacted directly with scientists during the *Meet a Scientist* Saturday events.

Offsite: Science Café and Other Community Events

The *ResearchLink* project provided additional public exposure to local scientific research through local Science Café demonstrations and at other community events. A total of 498 people were in attendance at the two Science Cafés combined, which averages to 249 visitors per Café event. As mentioned earlier, 198 adults attended the Science Café, *The Wonderful World of Moss!*, with Dr. Rosenstiel in October 2013. In addition, the Science Café held in February 2013, *Artificial Photosynthesis: Learning from Nature's Solar Energy Strategies* with Dr. Wamser, drew 300 attendees.

Additionally, OMSI brought local PSU scientists' research to additional public audiences through interactive tabletop exhibits at community events. While these programs initially were planned to take the form of traveling education programs, they were revised to involve tabletop exhibits and self-directed activities available to visitors at OMSI booths during summertime fairs and festivals. An estimated 333 visitors interacted with *ResearchLink* exhibits across four community events in the summer of 2014.

Online: Science Buzz Website

While technology limited the ability to determine the specific number of visitors reached through the OMSI kiosk, the total number of page visits recorded for the *Science Buzz* website during the period of June 2013 through August 2014 was 710, with 374 unique visitors. The *Science in Action* page received 233 visits of which 113 were unique, *Green Roofs + Solar Panels = Better Together?* received 169 visits of which 85 were unique, *Solar Cells with Organic Dyes: Cheaper, Cleaner* received 163 visits of which 101 were unique, *Why Solar Energy?* received 105 visits of which 62 were unique, and *Meet a Scientist* received 40 visits of which 13 were unique .

Overall, the project was not only successful in achieving its intended impacts regarding participant engagement, interest, awareness, and knowledge; the project multiplied that impact by expanding its reach to include audiences in the larger Portland, Oregon region and, through a strong internet presence, audiences throughout the United States and the world.

SUMMARY

Goal 1: Engagement and Interest

To what extent and in what ways were public participants engaged and interested in the research being presented?

- a) Were participants engaged and satisfied with the activities?
- b) Were participants interested in the content?

Measures of Success:

- a) At least 80% of surveyed museum visitors and Science Café attendees agree or strongly agree that they were interested in and intrigued by the research being presented.
- b) At least 80% of observed museum visitors who attend a facilitated activity demonstrate initiation or transition learning behaviors, such as doing the activity or expressing positive emotional response in reaction to their engagement.

The *ResearchLink* project surpassed its goal of engaging the interest of at least 80% of participants in the research presented. In addition, the goal of observing initiation or transition learning behaviors in at least 80% of visitors also was exceeded.

- **99%** of OMSI respondents reported that the experience **added value** to their museum visit.
- **97%** of OMSI respondents indicated that the experience had been **valuable or interesting** to them.
- **87%** of Science Café respondents were **completely or nearly completely** satisfied with their experience.
- **99%** of observed visitors demonstrated at least one **initiation or transition learning behavior**.

Goal 2: Awareness and Knowledge

To what extent and in what ways did participants increase their awareness of and knowledge related to the research being presented?

- a) Did participants gain knowledge about the science concepts presented?
- b) Were participants aware that the presenters/facilitators were scientists and that the research was happening locally?

Measures of Success:

- a) At least 75% of surveyed museum visitors and Science Café attendees report learning a new concept about the research presented, and at least 75% of observed museum visitors who participate in a facilitated activity demonstrate breakthrough learning behaviors during their participation such as making connections, referring to past experiences, or asking questions.
- b) At least 70% of museum visitors who interact face-to-face with a scientist are aware that the facilitator was a scientist and that the research was happening locally.

ResearchLink exceeded its goal of increasing knowledge of the science concepts presented in at least 75% of participants. However, the project did not succeed in making 70% of museum visitors aware that they were interacting with a local scientist during their facilitated activities onsite. Among visitors who were aware of their interaction with a local scientist, and once other visitors were made aware, the opportunity to interact with a local scientist was reported to be a highly valued opportunity.

The goal of increasing awareness and knowledge of the research presented through facilitated activities and demonstrations was achieved among both onsite visitors at OMSI and offsite participants in Science Café events. More than 75% of participants learned a new research-related concept. Although evaluators observed obvious breakthrough learning behaviors in 57%, rather than 75% of observed museum visitors, this discrepancy is likely a limitation of the method used: many of those observed were adults with children, and it is not unusual for adult visitors to allow their child/dependent to take the lead in engaging with museum exhibits and interactive experiences. However, through survey and interview data, it is clear that significant, meaningful learning experiences were indeed facilitated through the onsite activities.

- **100%** of Science Café respondents **learned something new** through the presentation.
- **90%** of OMSI visitors **learned new content** through *ResearchLink* activities.
- **57%** of observed OMSI visitors demonstrated at least one **breakthrough learning behavior**.

In addition, OMSI respondents who interacted directly with one of the scientists agreed that the experience was valuable to them and made them want to learn more about local scientists working in this research area. While most OMSI visitors (70%) and Science Café attendees (65%) did not report that they were aware that their facilitator/presenter was a local scientist, once they were made aware of this fact, the experience of interacting face-to-face with a local scientist described as being valuable.

- **90%** of visitors who interacted with a scientist specifically mentioned that they **valued being face-to-face with a scientist**.
- **70%** of these respondents indicated that they agreed or strongly agreed that the experience made them **want to learn more about local scientists** working in this research area.

Goal 3: Project Reach

To what extent and in what ways were public audiences reached throughout the project?

Measures of Success:

- a) At least 5,000 museum visitors participate in facilitated activities at OMSI.
- b) At least 300 visitors attending outreach community events will interact with activities created by PSU scientists.
- c) At least 400 people will attend the two *ResearchLink* Science Cafés.
- d) At least 1,000 page views will be recorded for the *ResearchLink*-related *Science Buzz* web pages.

The *ResearchLink* project exceeded its reach goals in nearly every area.

- *ResearchLink* reached approximately 8,750 visitors through facilitated activities onsite at OMSI, exceeding the goal of 5,000 visitors by 75%.
- *ResearchLink* drew 498 attendees to offsite demonstrations at Science Café events, exceeding the goal of 300 visitors by 25%.
- *ResearchLink* engaged 333 visitors at offsite community events, exceeding the goal of 300 visitors by 11%.
- *ResearchLink* attracted 710 verified page views to project-related content on the *Science Buzz* website. While this number falls short of the goal of 1,000 page views, the actual number of visitors reached is likely much higher, but unverifiable due to a technical problem with how Google Analytics interprets page views at the OMSI kiosk.

DISCUSSION

ResearchLink: Spotlight on Solar Technologies brought museum educators and PSU scientists together to develop informative, fun, and accessible demonstrations, facilitated activities, and interactive exhibits for public audiences of NSF-funded research. This summative evaluation measured the extent to which these demonstrations and activities were engaging and interesting, and whether participants gained knowledge and awareness about the scientific content related to the local scientists' research. Through observation, surveys, and interviews with participants both onsite at OMSI and offsite at Science Café events, evaluators gathered data to better understand how audiences experienced and learned from the activities. Participant counts were also collected to understand how many individuals were reached by the project.

Success: Facilitating Engaging Learning Experiences

The intention of the *ResearchLink* project was to strengthen public audiences' engagement, interest, awareness, and knowledge related to two NSF-funded research projects at PSU through dialogue-focused face-to-face interactions between scientists, OMSI educators, and the public. Given the findings of this evaluation, the PSU-OMSI collaboration was highly effective in achieving this deliverable. Overall, public participants expressed having a positive experience with *ResearchLink* programs and activities. Data collected directly from visitors as well as through observation of visitor behavior confirm this conclusion. The vast majority of visitors agreed that the activities were fun, clear, and covered good topics. Of all specific reasons given, the most common reason why visitors found their experience valuable was attributed to the scientists/presenters: their interactivity, approachability, or ability to engage visitors. Indeed, both visitor interest in the topic and desire to learn more about the topic increased after participation in the facilitated activities or demonstrations. This success was evident in observation data as well: facilitated activities onsite at OMSI attracted sustained visitor attention, and visible learning was evident in behaviors exhibited by almost everyone who engaged in these activities. A substantial number of visitors interacted with exhibits for longer than five minutes, and the majority showed at least one breakthrough learning behavior—including visible or audible emotional expressions of excitement.

Not only were visitor experiences successfully engaging and interesting; they were effectively instructive as well. The vast majority—95%—of total participants self-reported that they learned something new through their experience with *ResearchLink* activities. In addition to the observed breakthrough learning behaviors mentioned above, self-reported visitor understanding of the research substantially increased after participation in activities. Such understanding proved to go beyond superficial familiarity, as evidenced by open-ended responses in surveys and interviews. Most participants relayed detailed, specific information about scientific concepts, technological developments, and practical applications of the research presented. Many also integrated the content by connecting it to past experiences, existing knowledge, or future plans. These findings indicate that the *ResearchLink* activities were effective both in relaying information about key scientific concepts as well as in situating these concepts in a relevant and complex context that was accessible and pertinent to visitors' lives.

In addition, nearly each aspect of the *ResearchLink* project deliverables—from onsite activities to offsite demonstrations to the project webpages—drew more public participants than had been originally anticipated. The fact that the *ResearchLink* deliverables were appealing enough to not only meet, but exceed goal reach numbers shows that the project succeeded at engaging numerous members of the public with NSF-funded research being conducted locally at PSU. This level of public engagement multiplied the impact of *ResearchLink*, introducing more people in more places to current local research in solar energy and green roofs and buildings.

Areas for Growth: Attention to Venue and Emphasizing the Local

The vast majority of participants in data collection at OMSI-facilitated activities and Science Café demonstrations described their experiences as engaging, informative, and valuable. The primary suggestions for improvement from visitors indicate that considering the venue in which these activities are offered could provide an even better experience. Several Science Café participants noted aspects of the learning environment (room temperature, font size used on PowerPoint slides, café beverage offerings) as barriers to full enjoyment of the experience. While these were minor detractors from an overall positive event, closer attention to venue environment may enable a few small tweaks to improve visitor experiences at outreach events.

Similarly, better attention to the context at OMSI was also suggested by a few visitors. The placement of the tabletop exhibits was intended to provide access to a large amount of foot traffic, but some visitors found the exhibits too hidden. Some parents indicated that they would have preferred activities that were more accessible to a younger age, underscoring the wide age range of OMSI visitors. However, the most common additional comment/suggestion offered by OMSI visitors was to expand the programs to include more scientists and more facilitated activities in more locations. Visitors thought that one or two activities were insufficient: the context of OMSI as a relatively large museum with a wide variety of interactive learning opportunities lends itself to a more wide-scale implementation of *ResearchLink*-related or similar activities throughout the museum.

As noted previously, many participants related the content of *ResearchLink* activities and exhibits to past experiences, their present context, and/or future plans. This suggests that the research presented was perceived as applicable and relevant to participants' personal lives and local environment. A handful of visitor responses expressly discussed the importance of this research for the Portland, Oregon area and its appropriateness to the regional environment. However, when asked, many respondents did not indicate awareness that the research presented was happening locally. This may have resulted because the activities and presentations focused on—and successfully provided—fun, interesting scientific and technological content. Activity facilitators and demonstrators are tasked with meaningfully engaging and interacting with visitors in a short period of time. Through that effort, it is inevitable that some potential foci of activities are sidelined while others are foregrounded. While facilitating activities or providing demonstrations, PSU scientists and OMSI educators may have not had the chance to emphasize that this research is happening locally, in Portland, at PSU. If so, further development and refinement of these activities should consider ways in which this fact can be incorporated into existing content without sacrificing other, equally important scientific content.

REFERENCES

Barriault, C. 1999. The science center learning experience: A visitor-based framework. *The Informal Learning Review* 35(1).

Barriault, C. and D. Pearson. 2010. Assessing exhibits for learning in science centers: A practical tool. *Visitor Studies* 13(1).

Globe Advisors and the Center for Climate Strategies. 2012. *The west coast clean economy: Opportunities for investment and accelerated job creation*. Commissioned by the Pacific Coast Collaborative: www.pacificcoastcollaborative.org.

National Science Foundation SEES. 2011. http://www.nsf.gov/geo/sees/sees_portfolio.jsp.

Wamser, C. 2009. *Nanofibrous conductive polymers from aminophenylporphyrins: Mechanisms for conductivity and applications in solar cells*. Proposal to National Science Foundation, 2009. Funded in 2009: CHE-0911186. Portland, Oregon: Portland State University.

Wamser, C., T. Rosenstiel, and D. Sailor. 2009. *Integrating green roofs and photovoltaic arrays for energy management and optimization of multiple functionalities*. Proposed to National Science Foundation, 2009. Funded in 2009: CBET-0853933. Portland, Oregon: Portland State University.

APPENDIX A. Visitor Engagement Framework

Behavior types and descriptions are adapted from Barriault's Visitor Engagement Framework. Her framework consists of seven discrete learning behaviors that occur as part of a visitor's interaction with an exhibit. The learning behaviors can be grouped into three categories (initiation, transition, and breakthrough) that reflect increasing levels of engagement and depth of the learning experience. These behaviors and levels were then adapted for this project to suit the nature of hands-on facilitated learning experiences, rather than exhibit interactions. For this study, we also separated and added some additional behaviors in the breakthrough category.

Engagement and Learning Behavior	Description
Initiation Behaviors	
<i>When visitors demonstrate these learning behaviors, they are taking the first steps towards a meaningful learning experience. Even though they are not yet completely involved in the experience, they are gaining some level of information through the interaction which, in turn, could lead to more learning. Above all else, visitors need to feel comfortable about committing themselves to engagement. Initiation behaviors enable them to test the waters with minimum personal risk and provide an entry point into further learning opportunities offered by the activity.</i>	
1. Observes	Watches the demonstration and/or others participating with expressed interest
2. Physically participates	Physically participates in activity, but at a minimum level or simply follows directions
3. Answers simple question	Answers simple "engagement" question (e.g. yes or no?) from staff or group member
Transition Behaviors	
<i>Smiles and outbursts of enjoyment along with repetition indicate that a level of comfort has been achieved and that visitors are willing, and even eager, to engage more thoroughly. Regardless of whether the activity is repeated in order to better understand it, to master the functions, or to observe different outcomes, the net outcome is a more committed and motivated learning behavior.</i>	
4. Positive emotional response	Signs of enjoyment: smiling, laughter, verbal references (e.g. "this is fun/interesting"). Signs of eagerness to participate; excited disposition; invites someone else over to "try it"
5. More engaged in activity	Becomes more involved/engaged in activity (e.g. doing it more than once to achieve desired outcome, changes variables to look for a different outcome)

Engagement and Learning Behavior	Description
Breakthrough Behaviors	
<i>Each of these behaviors acknowledges the relevance of the activity, and the learning gained from the activity, to the individual's everyday life. The learning behaviors in this category reflect a commitment on the part of the visitor to gaining information and knowledge and to further exploring the ideas being presented. Their interaction becomes a meaningful learning experience that takes full advantage of the activity's learning opportunities. It becomes evident that the visitor is making meaning, building their own understanding of the concepts through prior knowledge, experience, and further inquiry.</i>	
6. Refers to past experiences	Makes connections with past experiences (e.g. "I saw that in a book and learned...", "This is like the exhibit over there on renewable energy...",")
7. Verbalizes connections	Makes connections with what they are observing (e.g. "Oh I see, this one is bigger so it gathers more energy...")
8. Seeks information	Asks questions to staff or visiting group about the topic/activity Reads signage
9. Shares information	Shares information (prompted or not) with staff or group members about topic or activity (e.g. explaining a theory, what they learned or observed, how to do an activity)
10. Deeply engaged and involved	Concentration and motivation are obvious; length of interaction significant; outcome or result of activity important, exploratory actions such as repeating the activity several times or significant discussion

APPENDIX B. *ResearchLink* Observation Sheet

Activity:	
------------------	--

Observer:	
Date:	

Age: Youth: 8–11 12–14 15–17 Adult: 18–29 30–50 51–65 65+	Gender: M F Unsure	Time Spent: min: sec
---	---------------------------	-----------------------------

learning behavior	✓	notes
Observes		
Physically participates		
Answers simple question		
Positive emotional response		
More engaged in activity		
Refers to past experiences		
Verbalizes connections		
Seeks information		
Shares information		
Deeply engaged and involved		

Other notes:

Sheet #	
Entered:	
Checked:	

APPENDIX C. *ResearchLink* Visitor Interview/Survey Instrument

To be filled out by the data collector

Survey# _____ Date _____ Gender Respondent: M F Approx. Age Respondent: 18–29 30–50 51–65 65+

Group Composition: Alone Group

Number in group: ____ Adults ____ Middle/High School ____ Elementary School ____ Pre-school ____ Infants

Hi, my name is _____, and I work for OMSI. We are currently trying to improve the demonstrations you just saw. We would very much appreciate you taking the time to talk with us about you and your group's experience with it. Nobody will see your responses. It's anonymous. Your participation in this survey is totally up to you and you can stop answer questions at any time or decide not to answer any questions you don't feel like answering. Would you like to participate in the survey today? Yes ____ No ____ (Data Collector: Thank and move on.)

Great! Then just to let you know this should take no more than 5 minutes. I will first ask you a couple of questions about your experience and then I will give you a ratings sheet to complete by yourself. We do it in two parts because we find it is the quickest and easiest way for our visitors to participate.

While you do this, we can stay and talk here or I can walk with you as you explore other parts of the museum. Sound good? Any questions for me?

Interview Questions

1. What was the most interesting or exciting thing you did or discovered during the demonstrations? [If they answer for their child, probe for them as an adult as well.]
2. How would you describe this demonstration(s) to a friend or relative? What would you say it was about? [Answer should be from the adult]
3. Was there anything new you learned that you didn't know before? [If they answer for their child, probe for them as an adult as well.]
4. [If educators] How, if at all, has this experience been valuable for you? [If scientists] How, if at all, has it been valuable having a SCIENTISTS or EXPERT here to interact with you (and your family)?

Thank you! Here is the rating form for you to complete. It should take 1–2 minutes. If you have any questions, I am right here.

How can we improve?

Please circle what best describes your experiences at this OMSI activity. Please be candid and honest. We are trying to get an accurate idea of what our visitors enjoy seeing and learning about.

	Great 5	Good 4	OK 3	Fair 2	Poor 1
1. Activity was					
Fun	5	4	3	2	1
Clear	5	4	3	2	1
Good topic	5	4	3	2	1

2. My (my group's) interest in this research area

Before	5	4	3	2	1
After	5	4	3	2	1

3. My (my group's) understanding of this research area

Before	5	4	3	2	1
After	5	4	3	2	1

4. Were you aware the research you heard about is local? ☐ Yes ☐ No ☐ Not Sure

5A. This experience added value to my visit today? ☐ Yes ☐ No ☐ Not Sure

5B. This experience made me want visit OMSI again? ☐ Yes ☐ No ☐ Not Sure

	Strongly agree 5	Agree 4	Neutral 3	Disagree 2	Strongly disagree 1
6. Because of this activity					
I (my group) want(s) to know more about this research area	5	4	3	2	1
I (my group) want(s) to know more about local or personal applications of this research	5	4	3	2	1
I (my group) want(s) to know more about the local scientists working in this research area	5	4	3	2	1

About you (optional)

7. How often do you come to OMSI?

- ☐ First time visitor
- ☐ Rarely (every few years)
- ☐ Occasionally (1–3 times per year)
- ☐ Regularly (4 or more times a year)

8. Are you an OMSI member?

- ☐ Yes
- ☐ No
- ☐ Not sure

9. How interested are you personally in science?

- ☐ Not interested
- ☐ Somewhat interested
- ☐ Neutral
- ☐ Interested
- ☐ Very interested

10. Have you ever worked in a science, engineering, or technology related field?

- ☐ Yes
- ☐ No
- ☐ Not sure

Anything else?

11. Any additional thoughts or comments you would like to share about this program?

THANK YOU FOR YOUR TIME. HAVE A GREAT DAY!

APPENDIX D. Science Café Survey



OMSI Science Café Survey

Please help us learn more about this program and enter to win 4 free passes to *The International Exhibition of Sherlock Holmes: Unlock the Mystery* at OMSI.

1. Please rate the following:

	Not at all interested				Extremely interested		
a. How interested are you in science?	1	2	3	4	5	6	7
b. <u>Before tonight</u> , what was your level of interest in learning more about the topic of the presentation?	1	2	3	4	5	6	7
c. <u>Now after the presentation</u> , what is your current level of interest in learning more?	1	2	3	4	5	6	7

2. What about this topic, if anything, would you like to know more about?

3. Please rate the following:

	Not at all knowledgeable				Extremely knowledgeable		
a. <u>Before tonight</u> , what was your level of knowledge about the topic?	1	2	3	4	5	6	7
b. <u>Now, after the presentation</u> , what is your current level of knowledge about the topic?	1	2	3	4	5	6	7

4. Were you previously aware that this type of research discussed tonight was happening locally?

☐ Yes ☐ No ☐ I wasn't sure

5. What, if anything, have you learned from this presentation that you didn't know before?

6. How would you rate your overall level of satisfaction with tonight's presentation?

Not at all satisfied

Completely satisfied

1 2 3 4 5 6 7

Tell us about yourself:

I am: ☐ Male ☐ Female ☐ Transgender
☐ Prefer not to answer

Age (circle range): 18–29 30–50 51–65 65+



OMSI Science Café Survey—continued

Trivia answers!

1
2
3
4
5
6
7
8
9
10

Want to share a little more about your Science Café experience? (optional)

7. How did you hear about this event? (select all that apply)

- ☐ I'm on the Science Café mailing list
☐ OMSI website ☐ Science Café flyer ☐ Facebook or Twitter
☐ McMenamins website
☐ University/college website or email (Which school?) _____
☐ Other _____

3. Why did you come to tonight's Science Café?

4. How could we improve the next Science Café?



Enter to Win 4 Free Passes to *Sherlock Holmes*

☐ YES! I want to enter the drawing to receive four free passes to the new *Sherlock Holmes* exhibition! Winners will be drawn from the list of returned surveys and contacted by email. Participation in the survey is not required for entry.

☐ YES! I want to receive Science Café emails!

Email: _____ Zip Code: _____

We will not sell or distribute your email address.

About this survey: The purpose of this survey is to learn more about programs like the OMSI Science Café in order to improve them. Participation in the survey is voluntary. Answers will be kept in strict confidentiality and no names will ever be reported. If you have any questions, please contact Melissa Laurie in OMSI's evaluation and visitor studies at (503) 797-4590.

APPENDIX E. Frequency and Examples of Observed Behaviors

ENGAGEMENT AND LEARNING BEHAVIORS	# of visitors	% of visitors	OBSERVED EXAMPLE OF BEHAVIOR*
INITIATION BEHAVIORS			
Observes: Watches the demonstration and/or others participating with expressed interest	75	91%	<i>Observes the facilitator and computer screen during the demonstration.</i>
Physically Participates: Physically participates in activity, but at a minimum level or simply follows directions	66	80%	<i>Covers solar panels with hands, using hairdryer and air can as instructed</i>
Answers simple question: Answers simple “engagement” questions from staff or group member	56	68%	<i>Answers a couple simple questions the facilitator asked such as which panel to cover or heat</i>
Total demonstrating at least one initiation behavior	81	99%	
TRANSITION BEHAVIORS			
Positive emotional response: Signs of enjoyment: smiling, laughter, verbal references	50	61%	<i>Smiles, says “Wow!” and after spraying panel with air can she raises hands in excitement</i>
More engaged in activity: Becomes more involved such as doing it more than once or changing variables	34	41%	<i>Tries a second activity, places ice on top of solar panel</i>
Total demonstrating at least one transition behavior	59	72%	
BREAKTHROUGH BEHAVIORS			
Seeks information: Asks questions to staff or visiting group about the topic/activity or reads signage	24	29%	<i>Asks question to facilitator “I don’t understand how the load increases”</i>
Verbalizes connections within the activity: Makes connections about the concepts they are observing	21	26%	<i>When asked why panel output dropped she says “It doesn’t get sunlight”</i>
Shares information: shares with staff or group members about topic or activity	15	18%	<i>Explains to companion and assists her as she operates tablet computer</i>
Refers to past experiences: Makes connections with past personal experiences	8	10%	<i>Says “we did something similar in Chemistry class”</i>
Deeply engaged and involved: Concentration and motivation are obvious; length of interaction significant; outcome or result of activity important, exploratory actions such as repeating the activity several times or significant discussion	18	22%	<i>Extended discussion with facilitator, “how well do these roofs work in Portland? It seems Portland would be the perfect place...”</i>
Total demonstrating at least one breakthrough behavior	17	57%	

*These examples are drawn from actual observations collected during the study

APPENDIX F: Facilitated Activities at OMSI--Dates, Duration, and Reach

Activity Delivery Hours

(Hours activity is on the floor—does not include set-up and take-down times)

CRPA Demonstration: Dyeing Light					
Date	Time	Total Hours	# Facilitators	Location	Notes
01/05/2014	11:00 a - 4:30 p	5.5	3	Earth - outside labs	\$2 Sunday
02/02/2014	11:00 a - 4:30 p	5.5	4	Earth - outside labs	\$2 Sunday
03/02/2014	10:30 a - 5:00 p	6.5	4	Earth - outside labs	\$2 Sunday
03/25/2014	10:30 a - 5:00 p	6.5	4	Earth - outside labs	PPS spring break
03/26/2014	11:00 a - 4:30 p	5.5	2	Earth - outside labs	PPS spring break
03/28/2014	9:30 a - 11:30 a	2	1	Earth - outside labs	PPS spring break
03/30/2014	10:30 a - 5:00 p	6.5	3	Earth - outside labs	PPS spring break
05/04/2014	11:00 a - 5:00 p	6	3	Earth - outside labs	\$2 Sunday
05/18/2014	2:30 p - 5:30 p	3	1	Earth - outside labs	families
05/25/2014	10:30 a - 4:45 p	6.25	3	Earth - outside labs	Memorial Day weekend
06/17/2014	10:00 a - 12:00 p	2	3	Earth - outside labs	families
06/28/2014	4:00 p - 5:15 p	1.25	1	Earth - outside labs	families
06/29/2014	10:30 a - 4:45 p	6.25	4	Earth - outside labs	families
07/6/2014	10:00 a - 5:00 p	7	4	Earth - outside labs	\$2 Sunday
07/13/2014	10:00 a - 4:45 p	6.75	2	Earth - outside labs	families
07/19/2014	10:00 a - 5:00 p	7	2	Earth - outside labs	Drive Revolution event
07/20/2014	10:00 a - 5:00 p	7	1	Earth - outside labs	families
07/27/2014	10:30 a - 4:30 p	6	1	Earth - outside labs	families
08/02/2014	10:30 a - 5:00 p	6.5	2	Earth - outside	families

				labs	
08/03/2014	10:30 a - 5:00 p	6.5	1	Earth - outside labs	\$2 Sunday
08/16/2014	9:45 a - 1:30 p	3.75	1	Earth - outside labs	families
08/16/2014	2:15 a - 5:00 p	2.75	1	Earth - outside labs	families
08/17/2014	2:00 p - 5:00 p	3	1	Earth - outside labs	families
08/23/2014	9:30 a - 12:30 p	3	1	Earth - outside labs	families
08/23/2014	1:30 p - 5:00 p	3.5	1	Earth - outside labs	families
Total hours: 125.5					

CRPA Demonstration: Solar Data					
Date	Time	Total Hours	# Facilitators	Location	Notes
01/05/2014	11:00 a - 2:45 p	3.75	2	Earth - outside labs	\$2 Sunday
02/02/2014	11:00 a - 4:30 p	5.5	4	Earth - outside labs	\$2 Sunday
03/02/2014	10:30 a - 5:00 p	6.5	4	Earth - outside labs	\$2 Sunday
03/25/2014	11:30 a - 5:00 p	5.5	4	Earth - outside labs	PPS spring break
03/30/2014	10:30 a - 5:00 p	6.5	3	Earth - outside labs	PPS spring break
05/04/2014	11:00 a - 1:30 p	2.5	3	Earth - outside labs	\$2 Sunday
05/25/2014	10:30 a - 4:45 p	6.25	3	Earth - outside labs	Memorial Day weekend
06/03/2014	10:00 a - 11:45 a	1.75	3	Earth - outside labs	school groups
06/17/2014	10:00 a - 12:00 p	2	3	Earth - outside labs	families
06/28/2014	10:00 a - 4:00 p	6	1	Earth - outside labs	families
06/29/2014	10:30 a - 4:45 p	6.25	4	Earth - outside labs	families
07/06/2014	10:00 a - 5:00 p	7	4	Earth - outside labs	\$2 Sunday
07/13/2014	10:00 a - 4:30 p	6.5	2	Earth - outside labs	families
07/19/2014	10:00 a - 5:00 p	7	2	Earth - outside	Drive Revolution

				labs	event
08/02/2014	10:30 a - 5:00 p	6.5	2	Earth - outside labs	families
08/14/2014	10:30 a - 1:00 p	2.5	1	Earth - outside labs	families, school groups
08/17/2014	10:00 a - 1:30 p	3.5	1	Earth - outside labs	families
Total hours: 85.5					

Meet a Scientist events				
Date	Time	Total Hours	# Scientists	Notes
03/26/2013	10:00 a - 12:00 p	2	3	PPS spring break
03/27/2013	10:00 a - 12:00 p	2	3	PPS spring break
03/28/2013	10:00 a - 12:00 p	2	4	PPS spring break
04/02/2013	1:00 p - 3:00 p	2	5	PPS spring break
04/03/2013	1:00 p - 3:00 p	2	4	PPS spring break
04/04/2013	1:00 p - 3:00 p	2	3	PPS spring break
10/12/2013	1:00 p - 4:00 p	3	2	<i>Meet a Scientist Saturday</i>
11/09/2013	1:00 p - 4:00 p	3	2	<i>Meet a Scientist Saturday</i>
12/14/2013	1:00 p - 4:00 p	3	2	<i>Meet a Scientist Saturday</i>
01/11/2014	1:00 p - 4:00 p	3	2	<i>Meet a Scientist Saturday</i>
03/08/2014	1:00 p - 4:00 p	3	2	<i>Meet a Scientist Saturday</i>
04/12/2014	1:00 p - 4:00 p	3	2	<i>Meet a Scientist Saturday</i>
05/10/2014	1:00 p - 4:00 p	3	1	<i>Meet a Scientist Saturday</i>
06/14/2014	1:00 p - 4:00 p	3	3	<i>Meet a Scientist Saturday</i>
07/12/2014	1:00 p - 4:00 p	3	2	<i>Meet a Scientist Saturday</i>
Total hours: 39				

Meet a Scientist Reach Data					
Date	Time	Visitor Count	# of Scientists	# of Activities/Tables	Location
11/09/2013	2:15 p - 2:45 p	26	2	2	Earth Hall - outside labs
11/09/2013	3:20 p - 3:50 p	32	2	2	Earth Hall - outside labs
12/14/2013	2:00 p - 2:30 p	0	1	2	Earth Hall - outside labs
12/14/2013	3:15 p - 3:45 p	15	2	2	Earth Hall - outside labs
01/11/2014	1:15 p - 1:45 p	14	2	2	Earth Hall - outside labs
01/11/2014	2:35 p - 3:05 p	26	2	2	Earth Hall - outside labs
03/08/2014	3:10 p - 3:40 p	26	2	2	Upstairs breezeway

04/12/2014	1:40 p - 2:10 p	10	2	2	Upstairs breezeway
05/10/2014	2:00 p - 2:30 p	24	1	1	Earth Hall - outside labs
05/10/2014	3:05 p - 3:35 p	23	1	1	Earth Hall - outside labs
06/14/2014	1:45 p - 2:15 p	25	3	3	Upstairs breezeway
06/14/2014	2:15 p - 2:45 p	26	3	3	Upstairs breezeway
07/12/2014	1:20 p - 1:50 p	25	2	2	Upstairs breezeway
07/12/2014	3:10 p - 3:40 p	26	2	2	Upstairs breezeway
Visitor Count Total: 298					
Total Hours: 7					
Average Visitors/Hour: 42.6					

Educator Reach Data						
Date	Time	Visitor Count	# of Educators	# of Activities/ Tables	Location	Notes
01/05/2014	12:45 p - 1:15 p	28	2	2	Earth - outside labs	\$2 Sunday
01/05/2014	3:40 p - 4:10 p	16	1	1	Earth - outside labs	\$2 Sunday
02/02/2014	12:45 p - 1:15 p	18	2	2	Earth - outside labs	\$2 Sunday
02/02/2014	3:45 p - 4:15 p	15	2	2	Earth - outside labs	\$2 Sunday
03/02/2014	12:00 p - 12:30 p	26	2	2	Earth - outside labs	\$2 Sunday
03/02/2014	3:45 p - 4:15 p	27	2	2	Earth - outside labs	\$2 Sunday
03/25/2014	12:30 p - 1:00 p	22	2	2	Earth - outside labs	PPS spring break
03/25/2014	2:00 p - 2:30 p	29	2	2	Earth - outside labs	PPS spring break
03/26/2014	12:45 p - 1:15 p	17	1	1	Earth - outside labs	PPS spring break
03/26/2014	3:45 p - 4:15 p	11	1	1	Earth - outside labs	PPS spring break
03/28/2014	10:00 a - 10:30 a	23	1	1	Earth - outside labs	PPS spring break
03/30/2014	11:25 a - 11:55 a	16	2	2	Earth - outside labs	PPS spring break
03/30/2014	3:00 p - 3:30 p	14	1	1	Earth - outside labs	PPS spring break
05/04/2014	11:15 a - 11:45 a	22	2	2	Earth - outside labs	\$2 Sunday
05/04/2014	1:15 p - 1:45 p	17	2	1	Earth -	\$2 Sunday

					outside labs	
05/18/2014	2:45 p - 3:15 p	12	1	1	Earth - outside labs	families
05/25/2014	11:00 a - 11:30 a	19	2	2	Earth - outside labs	Memorial weekend
05/25/2014	1:00 p - 1:30 p	29	2	2	Earth - outside labs	Memorial weekend
06/03/2014	10:30 a - 11:00 a	32	1	1	Earth - outside labs	school groups
06/17/2014	10:30 a - 11:00 a	16	3	2	Earth - outside labs	families
06/28/2014	10:30 a - 11:00 a	10	1	1	Earth - outside labs	families
06/28/2014	1:30 p - 2:00 p	23	1	1	Earth - outside labs	families
06/29/2014	11:00 a - 11:30 a	4	4	2	Earth - outside labs	families
06/29/2014	2:00 p - 2:30 p	18	2	2	Earth - outside labs	families
07/06/2014	11:00 a - 11:30 a	19	2	2	Earth - outside labs	\$2 Sunday
07/06/2014	2:00 p - 2:30 p	27	3	2	Earth - outside labs	\$2 Sunday
07/13/2014	11:00 a - 11:30 a	11	2	2	Earth - outside labs	families
07/13/2014	2:00 p - 2:30 p	22	1	2	Earth - outside labs	families
07/19/2014	11:00 a - 11:30 a	3	2	2	Earth - outside labs	Drive Revolution event
07/19/2014	2:30 p - 3:00 p	6	2	2	Earth - outside labs	Drive Revolution event
07/20/2014	11:00 a - 11:30 a	14	1	1	Earth - outside labs	families
07/20/2014	2:30 p - 3:00 p	16	2	1	Earth - outside labs	families
07/27/2014	1:30 p - 2:00 p	14	1	1	Earth - outside labs	families
08/02/2014	10:30 a - 11:00 a	2	2	2	Earth - outside labs	families
08/02/2014	1:30 p - 2:00 p	11	2	2	Earth - outside labs	families
08/03/2014	11:00 a - 11:30 a	24	1	1	Earth - outside labs	\$2 Sunday
08/03/2014	2:00 p - 2:30 p	14	1	1	Earth -	\$2 Sunday

					outside labs	
08/14/2014	11:00 a -11:30 a	11	1	1	Earth - outside labs	families
08/16/2014	11:30 a - 12:00 p	11	1	1	Earth - outside labs	families
08/17/2014	11:30 a - 12:00 p	5	2	1	Earth - outside labs	families
08/17/2014	3:00 p -3:30 p	10	1	1	Earth - outside labs	families
08/23/2014	10:00a - 10:30 a	11	1	1	Earth - outside labs	families
08/23/2014	3:00 p - 3:30 p	7	1	1	Earth - outside labs	families
Visitor Count Total: 702 Total Hours: 21.5 Average Visitors/Hour: 32.7						

Estimated # onsite visitors total	
Total hours of facilitated activities offered	250
Average # visitors per hour	35
Approximate total # visitors reached onsite	8750

APPENDIX G: Community Event Reach Numbers

These are estimates for the number of people who came into the room or tent where OMSI tabletop exhibits were set up and engaged or interacted with an OMSI tabletop exhibit or activity. Outreach staff estimate that at least a third of these visitors interacted specifically with *ResearchLink* tabletop materials.

Name	Location	Duration	# Visitors	# ResearchLink Visitors
Hermiston Fun Fest	Hermiston, Oregon	6 hours	~200+	~67+
Longview Science Fest	Longview, Washington	3 hours	~100+	~34+
Library Science Fest	Forest Grove, Oregon	3 hours	~100+	~34+
Wasco County Fair	Wasco, Oregon	36 hours (over 4 days)	~600+	~200+
Total:		48 hours	~1,000+	~333+