

PROGRAM PLAN

Science Communication Program for Brain Scientists

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Program Evaluation

Learning Goals

Using the best practices of the informal science education field, the Saint Louis Science Center's *Science Communication for Brain Scientists* program strives to achieve the following goals:

- Introduce graduate students to the field of informal science education and its approaches to science education.
- Provide graduate students opportunities to develop and deliver educational experiences about their research for the Science Center's general public audience, while working closely with Science Center staff members.
- Enable graduate students to understand the significant gap in knowledge and language that exists between specialists and lay audiences in different settings.
- Assist graduate students to identify and improve their audience engagement skills through observation, experimentation and practice.
- Provide graduate students with professional development that will enable them to communicate effectively about their scientific research and its importance with a large and varied public.

Workshops

Communication and audience training begins with casual lunch meetings, followed by guided observation of various SLSC programs. During July and August, Science Center staff conduct three 4-hour workshops, blending hands-on activities, presentations, readings and SciFest planning. The workshop content is refined each year based on feedback from each cohort. Because the first year's workshops preceded the initial SciFest event, the workshops focused on broad informal science education and public engagement themes. In subsequent years, preparing for SciFest has become the focal point of the students' interest during the workshops, providing less opportunity for discussions of larger societal and science literacy issues.

Workshop Organization

- **Workshop One: Audience** — overview of science center audience, front-end interviews with visitors
- **Workshop Two: Language** — plain language standards, concept mapping exercise with visitors, science writing for non-specialists, writing and peer editing activity
- **Workshop Three: Presentation tools/strategies** — simplifying scientific posters, designing demos and table top activities, SciFest planning

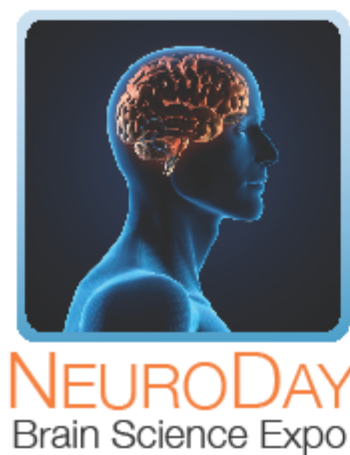
SciFest

SciFest is the Saint Louis Science Center's annual six-day celebration of science and technology through captivating presentations, thought-provoking talks, wacky experiments and engaging hands-on activities. Attendees can choose from a variety of individual sessions covering controversial, cutting-edge and everyday topics in science, presented by scientists and engineers. The capstone project developed by IGERT students is a featured, single day, FREE event within SciFest.

The capstone project is a coordinated, immersive experience focusing on the human brain and brain research. A primary goal is to communicate brain science to the general public by employing non-classroom strategies. This multi-faceted project has evolved to include a themed space bustling with unique presentations and activities designed to meet clear learning goals, media productions, real brains and fun group experiences. SLSC staff provide support through the workshop series, followed by coaching or guidance in instructional design, language level, quality of interaction and internal logistics/planning, graphic design and media..

An important part of SciFest preparation is the identification and design of tabletop activities or interactives that both complement the annual theme and help explain the research area of each grad student. Products and planning efforts for SciFest include the following:

- Themed program design with identified learning goals
- Variety of written pieces: short and long research biographies, activity posters and instructions
- Individual activity tied to research and developed uniquely for SciFest
- Media: behind-the-scenes video of labs, brain visualizations, introductory brain slide show
- Prototyping of activities with SLSC visitors prior to SciFest
- Overall program design, graphic design of print pieces, room theming, scheduling and supplies.



SciFest, October 2008: Cohort 1

Cohort 1 included eight PhD candidates in neuroscience, psychology and biomedical engineering. They transformed SLSC's Life Science Lab classroom into a house with a series of rooms. Each "room" had an 8'x8' backdrop related to the students' area of research and offered related tabletop or group activities staffed by the students. 400 visitors participated between 10 AM and 4 PM.

SciFest, October, 2009: Cohort 2

Cohort 2 included ten PhD candidates in neuroscience, psychology and biomedical engineering. They transformed SLSC's Life Science Lab classroom into a vibrant carnival space with carnival-themed booths. Each booth had a 4'x8' tent top and offered related tabletop or group activities staffed by the students. 500 visitors participated between 10 AM and 4 PM.

NeuroDay

NeuroDay is a key event in a collaboration between the Saint Louis Science Center and Washington University funded by the National Science Foundation, the DANA Alliance for Brain Initiatives and the Society for Neuroscience. It is a full-day brain science expo featuring the IGERT cohorts and their capstone project. Other brain science offerings, situated throughout the Science Center, range from Center Stage presentations to exhibitor displays to short talks.

Partners: Saint Louis Science Center, Washington University in Saint Louis, Washington University Medical School

Funding: NSF-IGERT (Integrative Graduate Education and Research Traineeship)

Duration: July 2006 through June 2011

Audience: Participants in this program are all graduate students in the Cognitive, Computational and Systems Neuroscience Pathway (CCSN) at Washington University in Saint Louis. CCSN is a specialized curriculum available to students pursuing a PhD in Neuroscience, Psychology or Biomedical Engineering.

Partnership History

The Saint Louis Science Center is a partner in Washington University's prestigious Cognitive, Computational, and Systems Neuroscience interdisciplinary graduate program funded by the NSF-IGERT (Integrative Graduate Education and Research Traineeship) flagship training program for U.S. PhD scientists and engineers. In 2005, Washington University faculty from neuroscience and biomedical engineering invited the Saint Louis Science Center to collaborate on a science communication program conceived to be part of the new IGERT curriculum. The goal would be to train each cohort of IGERT-funded graduate students in how to communicate brain science and their research to the general public. NSF funding was awarded in 2006; the Science Communication for Brain Scientists program planning began in earnest in 2007, with full implementation in 2008.

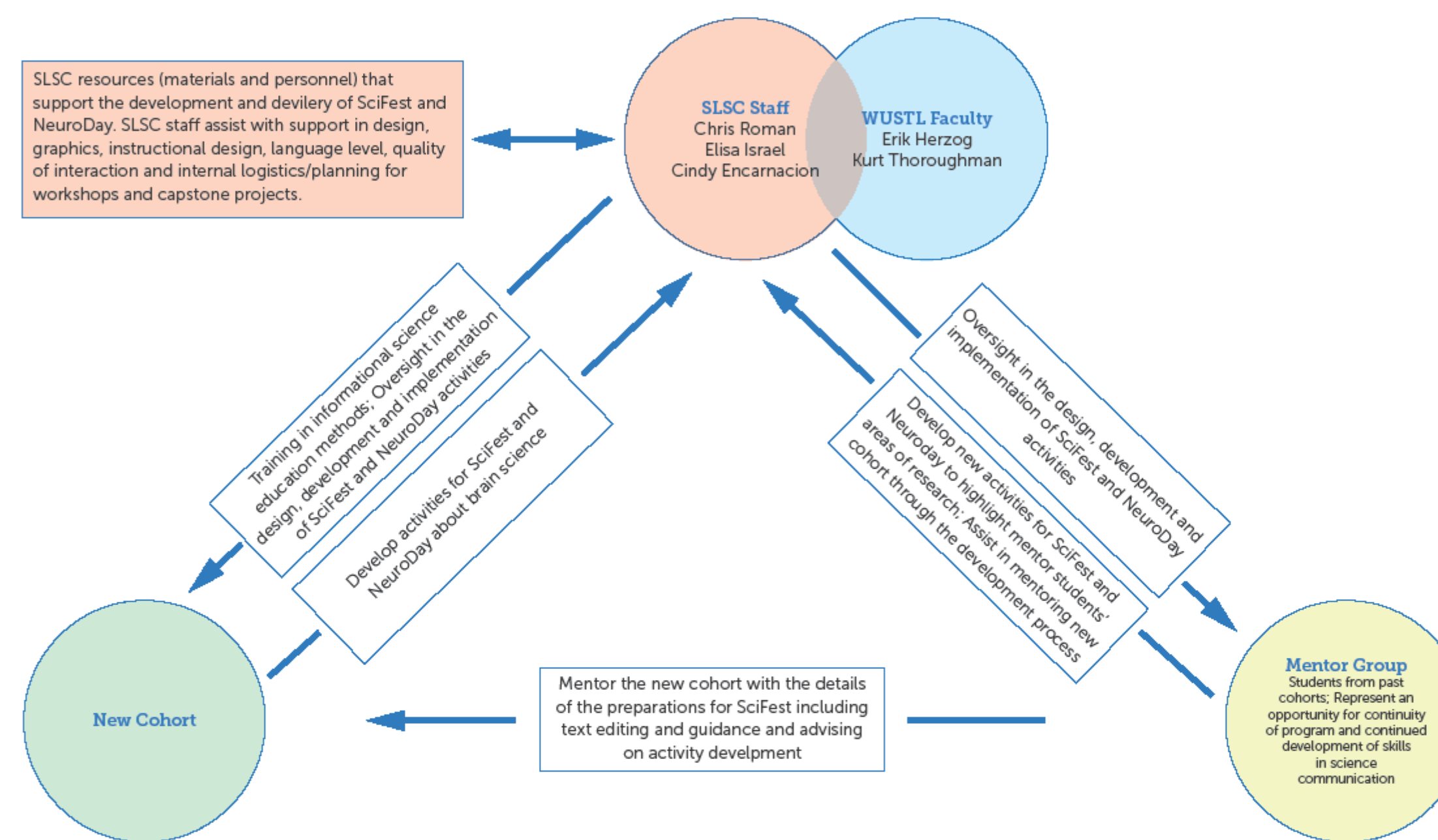
Now three years old, the Science Communication program involves extensive collaboration among all partners -- Washington University faculty and graduate students and Saint Louis Science Center educators and evaluators. Each year a new cohort of 7-10 graduate students participates in the training program; graduate students from earlier cohorts continue to participate as presenters, mentors or developers of unique activities highlighting their own research. An important program goal is to ensure that each cohort gains practical knowledge about various strategies for presenting brain science research to the public. Armed with this knowledge, they display increased confidence and sophistication in their presenting ability. Our evaluation findings suggest that they become more committed to continuing public outreach activities throughout their careers.

The collaboration is mutually beneficial for both institutions and the wider community. It provides graduate students, and their departments, with a deeper understanding of how to contribute to the public understanding of scientific research. Through the immersive workshop and visitor studies activities, IGERT participants learn to communicate effectively with a large general public audience about their field, their research focus, and the implications of the results. In turn, the Saint Louis Science Center's visitors are exposed to emerging and innovative research in experimental and computational approaches to neuroscience.

Roles in the IGERT Science Communication Training Program

Partnership Roles

The relationship between the Saint Louis Science Center and Washington University was not originally conceived as a partnership. Rather, the WUSTL faculty saw the Science Center as a sub-contractor, providing a service, and answerable primarily to the participating graduate students. Through many discussions and clarifications, we moved the relationship into a more collegial partnership, with greater respect accorded to the SLSC staff and expertise. Even so, the partnership continues to change to reflect new aspects to the project such as unforeseen mentor roles for earlier cohorts and dissemination opportunities requiring collaborative writing or presenting. The diagram here reflects the 2010 thinking about the partnership roles, intersections and dependencies.

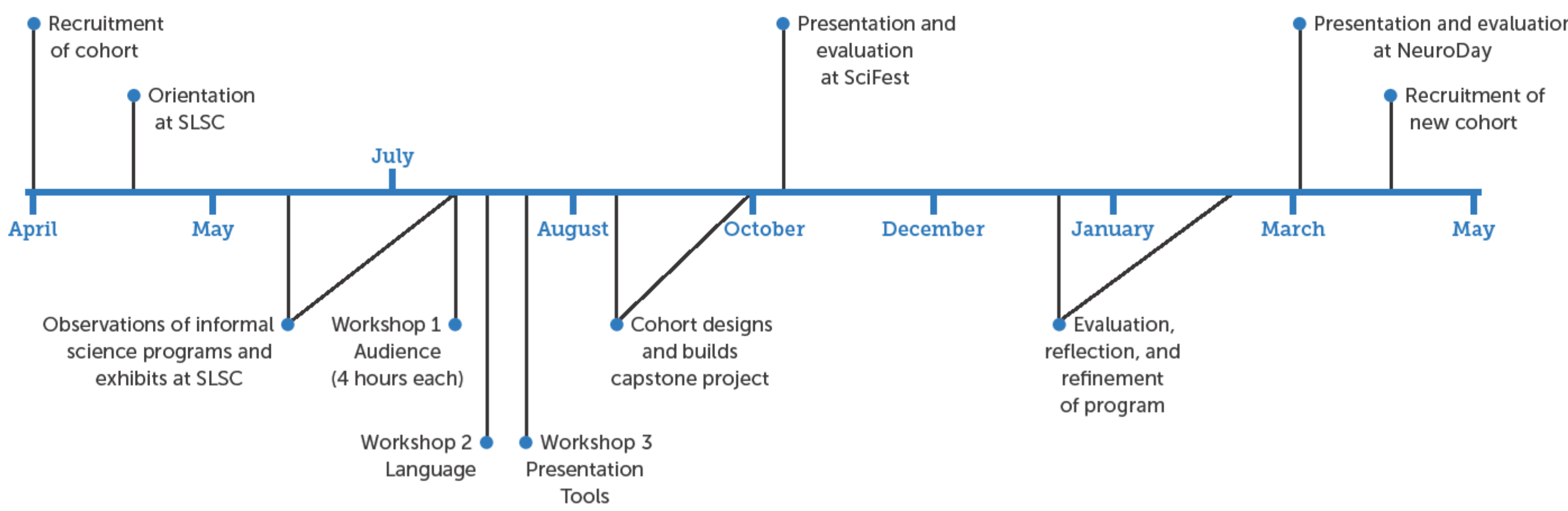


Annual program timeline

Program activities begin each spring with recruitment, introductory meetings, and observation of informal science education programs at SLSC. In mid-summer, SLSC staff lead a series of workshops that cover essential science communication skills,

provide experience with front-end evaluation and prototyping, and culminate in planning a student-designed capstone project. The capstone project is a highly engaging, interactive educational program highlighting brain science for general public audiences.

Students have two opportunities to present their capstone project: the first is in October during SLSC's large science festival, SciFest; the second is in March at SLSC's annual brain science expo, NeuroDay.



Collaborative Dissemination Efforts

2008
Webb, Alexis B., et al. 2008. Society for Neuroscience poster.
Fetch, Christopher, et al. *Offering instruction in communicating science to the public can, by itself, encourage science outreach.* Unpublished.

Roman, Christine M., panelist. 2008. *Critical Issues in Building a Portal to the Public for Current Science Research.* 2008 ASTC Conference.

2009
Israel, E., Gieseke, T., Roman, C., Willis, S., Wunar, B. 2009. The Roles of Evaluation in Training Scientists in Public Communication, *Conference Abstracts - Visitor Studies Association*, 35-36.

2010
Webb, Alexis B., et al. 2010. *Training scientists in a museum improves science communication to the public.* Article in submission, *Advances in Physiology Education*.

Roman, Christine M. and Elisa Israel, panelists. 2010. *Navigating Museum-Scientist Partnerships: Models, Logistics, and Results of Effective Programs.* ASTC 2010 Conference.

Recognition
2009 Finalist, Scientific & Professional Outreach Award, given by the Graduate Professional Council at Washington University in Saint Louis.



Evaluation Questions

- What are the students' incoming levels of familiarity with informal science education? How does this change over the course of the training?
- What are the students' incoming comfort levels with presenting current science to non-science audiences? How does this change over the course of the training?
- Given the optional nature of this component of the grant, what are the students' motivations for choosing to participate?
- What new skills do the students successfully apply in the development and delivery of their educational program(s)? How do they envision applying them in their professional careers?
- How effective are the students in communicating about the brain to Science Center visitors?

Methodology

Evaluation of this training program utilizes a multi-method approach. Due to the small numbers of students participating in the training (7-10 each year), much of the data collected from the students is qualitative.

From the Participating Students

Cohort 1 (2008-09) (n=8); Cohort 2 (2009-10) (n=9); Cohort 3 (2010-11) (n=7)

- Pre- and post-workshop surveys
- Focused observations of student interaction with visitors during SciFest and NeuroDay events
- Interviews immediately after SciFest and NeuroDay
- Follow-up surveys at the conclusion of the year

From Visitors

SciFest 08 (n=55); NeuroDay 09 (n=36); SciFest 09 (n=68); NeuroDay 2010 (n=116)

- Paper feedback forms at SciFest and NeuroDay

Surveys of both the students and visitors incorporated the Science Center's **System for Assessing Mission Impact (SAMI)** questions. These four questions are used across all Science Center programs and designed to specifically address the Science Center's definition of Impact, key elements of which are: knowledge gained, enjoyment of the program, interest in science, and attitude toward science. These close-ended questions using a four-point scale address each of these four elements. Those ratings are added together to achieve an Impact Score, which ranges from 4.0 to 16.0.

Key Findings from Cohorts 1 & 2

- **Impact Scores for the full training experience (workshops, SciFest, and NeuroDay) over the students in both cohorts were high.**

The overall mean Impact Score for Cohorts 1 and 2 was 13.6 out of 16.

- **Students' self-rated familiarity with informal science education increased over the course of the training. Mean ratings on a 4-point scale:**

	Cohort 1	Cohort 2
Before the workshops	2.3	2.3
After NeuroDay program	3.3	3.3
One year later	3.4	NA

- **Students' self-rated comfort with presenting science to non-science audiences increased over the course of the training. Mean ratings on a 4-point scale:**

	Cohort 1	Cohort 2
Before the workshops	2.1	2.5
After NeuroDay program	3.3	3.7
One year later	3.7	NA

- **Students were motivated to learn communication skills:**

"I wanted to develop my skills in translating what I do in the lab into activities and information for the general public." – Cohort 1 student

"To translate some of the interesting ideas and concepts that stimulate research in my field to the general public in the hope that in doing so brain science will be better understood and more accessible." – Cohort 2 student

- **Students were able to describe their improved communication skills and comfort with science communication:**

"I am now more aware of the jargon that I use when I describe science. I try to define new words with examples or describe concepts in simpler terms." – Cohort 1 student

"I've tried to become more aware of the background knowledge that I have compared to that which my audience brings." – Cohort 2 student

"Focusing on how to give a concrete message that is easy to follow, is a strategy that I try to use when writing abstracts, papers and designing posters." – Cohort 2 student

"I found out I really enjoy communicating about science and it helped me become more confident while doing it." – Cohort 1 student

- **Visitor Impact Scores were high.**

The overall mean Impact Score for all offerings of Real World: Neuroscience (Cohort 1) and Amazing Brain Carnival (Cohort 2) was 14.0 out of 16.

- **The student-developed programs were effective at communicating about the brain to Science Center visitors.**

Students in Cohort 2 identified three learning objectives for their program, Amazing Brain Carnival: 1) the brain has different parts that do different things, 2) the brain changes, and 3) the brain can be studied in a variety of ways. In response to an open-ended question inquiring what they learned about the brain, comments from 37% of respondents specifically addressed at least one of the learning objectives. Another 40% provided more general comments about the brain.

- **Visitors had positive engagements with the students.**

In response to a question asking whether the student presenters were engaging, visitors to Cohort 2's Amazing Brain Carnival gave a mean rating of 3.4 out of 4, with 49% selecting the highest rating.