National Living Lab Broad Implementation, Year 1: *Creating Communities of Learners for Informal Cognitive Science Education*

Formative Evaluation Report

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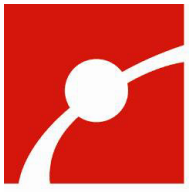

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Living Laboratory®
Developed at the Museum of Science, Boston

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EXECUTIVE SUMMARY

Living Laboratory®, developed at the Museum of Science, Boston in 2005, is a new model for partnerships between museums and cognitive scientists, bringing cognitive scientists to museums, where they conduct active research studies with museum visitors as their subjects. In 2011, the Museum of Science received a National Science Foundation (NSF) grant (DRL-0714706) to begin scaling up *Living Laboratory*. The program is currently in Year 1 of expansion to three new Hub sites: the Madison Children's Museum, the Maryland Science Center, and the Oregon Museum of Science and Industry. This report summarizes all formative evaluation from Year 1 of the project.

Formative evaluation focused on the program's impact on two professional audiences (cognitive science researchers and museum educators) and one public audience (adult museum visitors). Two framing questions guided the evaluation:

1. How can the project deliverables be designed to maximize impacts on both museum and academic professionals in order to facilitate 1) an increase in capacity for mutually beneficial collaboration between museum educators and cognitive scientists, and 2) the introduction of on-site research and other informal cognitive science education activities at a wide range of museums?
2. How can the educational materials developed for the public through on-site research programs best be adapted to meet the learning needs of adult visitors to a wide range of museums serving young children?

Data collection involved observations of and interviews with visitors interacting with cognitive science researchers and museum educators, as well as pre- and post-surveys of museum educators and cognitive science researchers to measure their confidence and self-efficacy communicating about cognitive science research. Data were collected by staff at all four Hub sites during summer 2012. Analysis was conducted for Hubs on an individual basis, then presented and discussed with each Hub site. For this report, data were analyzed on a cross-site basis to attempt to find patterns in program outcomes across sites. With respect to the professional audiences of cognitive science researchers and museum educators, the following findings emerged:

- Almost all cognitive science researchers discussed with visitors the purpose of their study or gave a description of study activities, while few discussed connections to everyday life or overall observations thus far.
- Many Living Lab cognitive science researchers expressed some confidence in their abilities to communicate about their research when they were initially starting the program, but self-efficacy was even higher among cognitive science researchers who had participated for 3 to 6 months.
- The most common topics of conversation between museum educators and adult visitors during Research Toy interactions were different at each site. The least common topics of conversation were follow-up studies, related activities, cognitive science in general, and relevance of research.

- Before starting Living Lab, most museum educators felt comfortable with explaining research to different audiences, although some had concerns with talking about cognitive science researchers' methods and answering questions about child development.
- New museum educators may feel less comfortable recommending resources for learning more about Living Lab research.

With respect to the public audience of museum visitors, the following findings emerged:

- Almost all adult visitors observed their child's behavior during the Research Toy interaction, and at two sites, facilitated the Research Toy interaction as well[1]. Adult visitors were also observant while their children participated in research studies.
- Most visitors had positive feedback for the cognitive science researchers and were interested in following up. Adult visitors across sites also had positive experiences with the Research Toys, with almost all saying they found the activity interesting and identifying something new they learned.
- Adult visitors who interacted with cognitive science researchers or museum educators recognize that psychology researchers engage in the scientific process, but they may still have some misconceptions about psychology as a science.
- Though it was not a common topic of conversation with cognitive science researchers or museum educators, most adult visitors identified a way in which the research, either from the Research Toys or the in-progress research, was relevant to their own lives when asked after their educational experience

Since each Hub site had the opportunity to discuss the data with evaluators in summer 2012, several changes have already been made to the programs at each site. As the program moves into Year 2, formative evaluation will focus on mutual professional development efforts at each Hub site, looking at efficacy of museum educator trainings, cognitive science researcher communication, and expanding the program to broader public audiences.

[1] "Facilitating the Research Toy interaction" could mean that the caregiver repeated the educator's instructions, asked probing questions, prompted the child, or helped the child use the Research Toy.

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I. INTRODUCTION

In 2011, the Museum of Science received a National Science Foundation (NSF) grant (DRL-0714706) to begin scaling up *Living Laboratory*®. Developed at the Museum of Science, Boston in 2005, *Living Laboratory* is a new model for partnerships between museums and cognitive scientists that focuses on education-driven on-site research and mutual professional development between cognitive science researchers and museum educators. The "mutual professional development" model posits that museum educators and cognitive science researchers will learn new skills from each other while participating in the program. Museum educators gain knowledge about the methods, processes, and findings of cognitive science research, and cognitive science researchers learn new techniques for communicating their research to the public.

The program brings cognitive science researchers to museums, where they conduct active research studies with museum visitors as their subjects. Museum visitors then get the chance to engage in one-on-one conversations with cognitive science researchers, whether or not they are eligible for the studies. Museum educators also create interpretations of real research studies, called "Research Toys," to bring onto the museum floor and use with visitors.

The program currently has four "Hub" sites including the Museum of Science, Boston (MOS), which is partnering with the Harvard Graduate School of Education and several other institutions. The Madison Children's Museum (MCM) is partnering with University of Wisconsin-Madison, the Maryland Science Center (MSC) is partnering with Johns Hopkins University, and the Oregon Museum of Science and Industry (OMSI) is partnering with Lewis and Clark College. Some Hubs partner with multiple labs at one institution, some with one lab at one institution, and some with multiple labs *and* multiple institutions. MSC began running research participants in December 2011, while MCM and OMSI began in February 2012. In the third year of the project, the four Hub sites will continue to engage deeper in mutual professional development, and will begin to help other local museums and academic institutions form partnerships in the *Living Laboratory* model.

The program focuses on three audiences: museum educators and cognitive science researchers, who serve as primary professional audiences; and adult museum visitors, who are a secondary public audience. The National Living Lab project aims to create measurable change in all of these audiences in various ways. These changes are summarized in the *Living Laboratory* Essential Elements, developed at the Museum of Science. The Essential Elements are necessary goals for any *Living Laboratory* program, regardless of site. They are organized into two groups according to whether they apply to public or professional audiences. The Essential Elements are listed below.

Goals for Public Audiences

- Visitors contribute to the process of scientific discovery through participation in active studies
- Visitors engage in one-on-few educational interactions with scientists conducting the research

- Visitor education focuses on the process of science, increasing interest in and understanding of research "questions and methods" as well as "results"
- Studies occur in plain-view of the public, on the exhibit floor
- Non-participant visitors talk with researchers and learn about on-going studies in ways similar to study participants
- On-site research is an expected and predictable part of the visitor experience

Goals for Professional Audiences

- Researchers receive training from museum staff in effective museum-style education techniques, improving researchers' communication skills with public audiences
- Museum educators gain direct access to current science that is relevant to their work with the public, improving educators' understanding of science and its potential application to their practice
- Museum educators and researchers communicate regularly, collaboratively monitoring the program to ensure scientific and educational goals are met, and that programmatic needs (e.g. logistical, financial) are fulfilled.

Year 1 of this scale-up focused on four objectives: 1) Establishment of program at the three new Hub sites, 2) Symposia events, where professionals with varying levels of engagement with the program can meet face-to-face to learn about the program and share collaboration strategies, 3) A "Virtual Hub," a website, where project partners can find resources, information, and contact other professionals, and 4) A toolkit of resources for professionals interested in establishing a program in the *Living Laboratory* model.

Formative evaluation of the project during Year One focused primarily on objective 1, the establishment of new on-site research programs. The overarching goal of formative evaluation for this year was to find specific ways to optimize and improve the project deliverables as the three new hub sites were established. To achieve this goal, evaluation posed the following questions:

1. How can the project deliverables be designed to maximize impacts on both museum and academic professionals in order to facilitate 1) an increase in capacity for mutually beneficial collaboration between museum educators and cognitive science researchers, and 2) the introduction of on-site research and other informal cognitive science education activities at a wide range of museums?
2. How can the educational materials developed for the public through on-site research programs best be adapted to meet the learning needs of adult visitors to a wide range of museums serving young children?

The evaluation centered on two aspects of the program: researchers' interactions with museum visitors and museum educators' interactions with visitors through Research Toy interpretations, which are museum educator-led interpretations of previous studies using recreated stimuli. To answer question 1 concerning the professional audiences, the following subquestions were formulated:

a. How do cognitive science researchers communicate about their research and behavioral science in general with families?
b. How confident are cognitive science researchers about their ability to communicate about their research with visitors? What are their attitudes towards communicating with visitors about cognitive science research in general and about their research specifically?
c. How do museum educators communicate about the research represented by the Research Toys and about behavioral science in general with families?
d. What is the museum educator comfort level with and attitudes about communicating behavioral science research to visitors?

To answer question 2 concerning the public audience, a second set of sub-questions was also formulated:

a. How do adult visitors interact with children during Research Toy interactions and research study participation?
b. After interacting with the museum educators and Research Toys, what do adult visitors understand about cognitive science? What do they understand about cognitive science after interacting with cognitive science researchers?
c. How do families feel about the conversations they are having with cognitive science researchers and museum educators, and what are the learning, attitude, and interest outcomes of these conversations for adult visitors?

Evaluation occurred at the four Hub sites in Madison, WI, Boston, MA, Baltimore, MD, and Portland, OR. Evaluators at the Museum of Science, Boston designed instruments and provided instruction or training for data collection techniques to staff at the other three hub sites. Staff at the Hubs collected the data and sent them back to the Museum of Science for analysis. Individual reports have been disseminated to the Hub sites and presented at the November 2012 Symposium. This report contains a summary of formative evaluation activities during Year One and analysis of similarities and differences across the four Hub sites where appropriate.

II. METHODS

Formative evaluation of the National Living Lab project involved a diversity of methods designed to gather data from across the four regional Hub sites for comparison. The following formative evaluation tools were used to gather data about the program:

1. Observations and interviews focused on cognitive science researchers' interactions with visitors
2. Observations and interviews focused on museum educators' interactions with visitors during Research Toy interpretations
3. Surveys assessing cognitive science researchers' self-efficacy for communicating with visitors about research
4. Surveys assessing museum educators' self-efficacy for communicating with visitors about research

The target audience for the two observation and interview tools was adult museum visitors who were attending with children that participated in research studies or educational conversations with the cognitive science researchers or research toy interactions with museum educators. The observation and interview evaluation tools were used by staff at each regional hub site to collect data, beginning in April 2012 and concluding in August 2012. During this time, a total of 368 individual subjects were observed, and 120 adult visitors were interviewed (See Table 1).

TABLE 1. Number of Subjects Accrued by Instrument, across Hub Sites.

Evaluation Instrument	# of Groups	# of Individual Subjects
Researcher observation	63	191
Post-briefing interview	60	60
Educator observation	61	177
Post-interpretation interview	60	60

The self-efficacy surveys were sent to cognitive science researchers and museum educators who were beginning to participate in the Living Lab program in May 2012. These cognitive science researchers and museum educators were asked to fill out a similar version of the survey after a few months of participation in the program. Thus, the target audience for the two self-efficacy surveys was museum educators or cognitive science researchers who were at the beginning of their involvement with the National Living Lab project.

In total, 18 of both initial and final self-efficacy surveys were collected from museum educators. For the researcher self-efficacy surveys, 51 cognitive science researchers who had been participating in Living Lab for 1 month or less completed the initial self-efficacy survey, and 27 of these cognitive science researchers completed the survey after they had been participating in Living Lab for 3 to 6 months.

1. DATA COLLECTION INSTRUMENTS

1.1 Observations and interviews focused on cognitive science researchers' interactions with adult visitors

The Essential Elements (see Introduction) of *Living Laboratory* state that public audiences should have the opportunity to engage in "one-on-few educational interactions with scientists." These typically take the form of a short conversation after the participant has finished the study activities. Cognitive science researchers are instructed to talk with all interested museum visitors, even those who are not eligible to participate into their study, whether it is because parents or legal guardians are not present or the children do not fit the needed sample. These "educational opportunity" visitors thus get the same educational experience as visitors who participate in the study as subjects.

Cognitive science researchers in the program are also encouraged to focus their conversation on the process of science: hypotheses, research questions, methods, etc. Cognitive science researchers generally approach parents in the museum, give them a short introduction to the study, and, if the parent is interested, have them sign a consent form for their child. The researcher then runs the child as a study participant, inviting the adult caregiver to observe the child's experience. Afterward, the cognitive science researcher begins a conversation with the adult visitor asking them what they observed the child do, briefs the parent on what happened during the study, and answers any questions that the parent has. If the child is not eligible for the study, but the visitors are still interested in the study, the group becomes an "educational opportunity." The cognitive science researcher may run the child through the study without taking any data and have a similar interaction with the adult visitor about their observations, or may explain the study to the adult visitor in detail, answering any questions they have.

It is not expected or realistic that cognitive science researchers and visitors discuss every possible aspect of the scientific process during these discussions, as the interaction takes place in a dynamic museum setting and the possibility for conversation directions are endless. Therefore, cognitive science researchers often tailor their explanations to the interest level, question topics and time constraints of visitors, a skill often acquired from museum professionals during their Living Lab professional development training and honed during their many interactions with visitors at the museum.

In order to capture the content of these conversations, data collectors observed the cognitive science researchers' interactions with visitors and recorded which aspects of the scientific process were discussed. They also recorded any questions the visitors asked, and whether or not the caregivers were observing their children during the study. The observation tool provided data about which topics of conversation were the most common and which were the least common.

Data collectors also interviewed adult visitors after their interactions with cognitive science researchers. This interview was designed to uncover what visitors at the hub sites were getting out of their interactions with the cognitive science researchers. The interview consisted of two

parts: 1) a sorting activity about misconceptions of cognitive science, and 2) open-ended questions.

For the sorting activity, visitors were asked to look at a list of activities and mark which activities were a part of the researcher's study, which were not, and which they were not sure about. Some activities were science activities adapted from the Committee on Conceptual Framework for the New K-12 Science Education Standards (National Research Council, 2012). Some of the science activities could have been directly observed by the visitor during an interaction with the researcher, while others were not directly observable. The rest of the activities were common misconceptions about psychology, adapted from a 2008 benchmark study from the American Psychological Association (Penn, Schoen & Berland Associates, Inc.). Visitors were then asked to explain more about two activities they saw the researcher doing that day. The sorting activity was intended to provide some insight into how museum visitors view cognitive science researchers and to what extent they think of psychology as a science.

In the open-ended questions, visitors were given the opportunity to do things such as provide general feedback on the researcher's communication techniques and indicate interest in following up. Hub staff at each site collected paired observation and interview data for 15 visitors, five of which were educational opportunities. The observation sheet is provided in Appendix A. The interview can be found in Appendix B.

1.2 Observations and interviews focused on museum educators' interactions with visitors during Research Toy interpretations

The Research Toy interpretation observation instrument was similar in design to the observation instrument used to assess cognitive science researchers' interactions with visitors, described in section 1.1 above. Data collectors observed museum educators conducting Research Toy interpretations. As described in the introduction, Research Toys are museum activities inspired by completed research studies and their stimuli. In Research Toy interpretations, museum educators lead children through an activity with the visitor that is similar to what was done in the real study. As the child or children are engaged with the activity, the educator discusses the study and research with the adult caregiver. Data collectors listened to conversations to track what aspects of the scientific process were being discussed (e.g. research questions, findings, different conditions) as well to note what questions, if any, caregivers asked. Hub staff collected paired observation and interview data for 15 groups. The observation instrument can be found in Appendix C.

Following the observation, the data collector conducted a short interview with the visitor to see if they understood the research being presented, if they found it interesting, and if they learned anything new from doing the Research Toy the activity. The full interview is presented in Appendix D.

1.3 Surveys focused on self-efficacy for communicating with diverse audiences about research

Self-efficacy is defined as the self-judgment of one's ability to perform a task within a specific domain (Bandura, 1982). Self-efficacy can have implications for motivation, task persistence, and behavior choices. It is also related to confidence. In order to assess cognitive science researchers' self-efficacy in communicating their research with the public, evaluators created a short online survey for the cognitive science researchers to fill out.

The survey was administered to cognitive science researchers before their orientation session began, one month into their semester/summer, and once more at the end of the semester/summer. This schedule was based on the idea that cognitive science researchers might start with high self-efficacy or confidence before completing any research shifts, experience a decline after one or two research shifts, and then see their self-efficacy or confidence steadily climb back up as they gained experience. This hypothesis was drawn from research about new teachers (Hoy, 2000). Hoy's research showed that teachers finished their coursework with high self-efficacy, but it dropped when they were confronted with the day-to-day reality of student teaching. Evaluators were interested to know if cognitive science researchers' experiences mirrored this process at all and if this communication skill changed over time. Due to logistical issues, few cognitive science researchers were able to complete the survey one month into their semester, and only initial self-efficacy and self-efficacy after 2 or more months of participation were used in the analysis.

The online survey contained 19 items for cognitive science researchers to rate on a 5-point Likert scale, with 1 being Strongly Disagree and 5 being Strongly Agree. Respondents were asked to rate their agreement with domain-specific task statements, such as "I am comfortable explaining the research methods involved in my study" or "I feel confident explaining my research to Museum staff and volunteers." The 1-month and end-of-semester surveys were identical, but with open-ended questions about the cognitive science researchers' perceptions of the easiest and most difficult parts of communicating their research through *Living Lab*. The final survey can be found in Appendix E.

A similar survey was used to assess museum educators' confidence for communicating about cognitive science research with diverse public audiences. The self-efficacy survey for museum educators was based on the one for cognitive science researchers, but with only 12 items. Museum educators also rated their agreement with domain-specific task statements, such as "I can answer questions about the methods used by Living Lab researchers" or "I feel comfortable responding to questions about child development in general." The final survey can be found in Appendix F.

The survey was administered to museum educators as they began participating with Living Lab, one month into their semester/summer, and once more at the end of the semester/summer. Only initial self-efficacy and self-efficacy after 2 or more months of participation were used in the analysis.

2. SAMPLE INFORMATION

During the observations of visitors with both museum educators and cognitive science researchers, Hub site staff collected information about both the visitors and the cognitive science

researchers/museum educators with whom they were interacting. The sample information is presented below, with samples from each site presented along with totals.

TABLE 2. Description of Cognitive Science Researchers Observed Interacting with Visitors (n=63).

Description of Researcher	MCM	MOS	MSC	OMSI	Total
Undergraduate student	0	7	10	17	34
Graduate student	15	3	3	0	21
Post-doctoral researcher	0	2	2	0	4
Professor	0	4	0	0	4

The differences between sites stem from the different types of museum-academic institution partnerships. At the time of the evaluation, OMSI was partnering with an undergraduate-only college, while MOS was partnering with 10 different institutions. Even though MCM and MSC were paired with single labs from single institutions, only graduate students were observed at MCM, while a range of researcher types were observed at MSC. Some differences were observed in museum educators facilitating Research Toy interactions as well:

TABLE 3. Description of Museum Educators Observed Interacting with Visitors (n=61).

Description of Educator	MCM	MOS	MSC	OMSI	Total
Volunteer	0	0	0	3	3
Intern	15	0	0	11	26
Staff	0	15	15	2	32

These differences show the flexibility of the Living Lab model. All four Hub sites are implementing a program that is fully consistent with the Essential Elements, but they are partnering with different types of academic institutions, and different kinds of museum educators support the programs. This flexibility is a strength of the model, especially when considering dissemination to new partners. Even though Living Lab began at the Museum of Science in Boston, future partners need not be similarly large science centers with multiple academic partners to successfully implement the model.

Staff also tracked the relationship of the adult visitors to the child or children with whom they came to the museum. These descriptions are presented in the tables below:

TABLE 4. Description of Visitors Interviewed After Researcher Interactions (n=60).

Visitor Description	MCM	MOS	MSC	OMSI	Total
Parent	11	12	14	15	52
Grandparent	2	0	0	0	2
Other relative	1	1	0	0	2
Nanny	1	0	1	0	2
Other/unknown	0	1	0	1	2

TABLE 5. Description of Visitors Interviewed After Educator Interactions (n=61).

Visitor Description	MCM	MOS	MSC	OMSI	Total
Parent	13	11	11	8	43
Grandparent	2	2	1	4	9
Other relative	0	0	0	1	1
Nanny	0	2	3	1	6
Teacher	0	0	0	2	2

As shown from the above tables, the types of visitors interacting with cognitive science researchers and museum educators may be slightly different. This may be because cognitive science researchers are more likely to target visitors who are able to participate in their studies, since parental consent is required.

3. DATA ANALYSIS

Data were collected by staff at each hub site, and forms were scanned and sent to evaluators at the Museum of Science. Evaluators at MOS coded the qualitative data using a typological analysis strategy (Hatch, 2002). This strategy involved first identifying categories of interest for each form of data, and then open-coding qualitative data within each category. This analysis was designed to enable evaluators to align the analysis of the data with the objectives of the National Living Lab project. For example, observations of the briefings and interviews with visitors after the briefings were coded for evidence of whether cognitive science researchers discussed methods, research questions, implications, and further things to do or observe relative to their research questions with parents, and, if so, how these ideas were discussed. The MOS Research & Evaluation department conducted preliminary analysis of the data, and shared and discussed analyses and findings iteratively with project partners. Feedback from project partners have informed and improved the analysis of the data. The analysis and the associated reports were and are still being used to identify areas in which museum educators and cognitive science researchers need additional support from the National Living Lab project.

III. RESULTS AND DISCUSSION

This section of the report focuses on findings from the various formative evaluation methods during year one of the National Living Lab project. This section will frame findings from across all four sites, with differences between the Hub sites noted where appropriate. However, cognitive science researchers and museum educators who completed the self-efficacy surveys were not asked to identify their site, so survey results were not analyzed for differences between sites. The findings section is organized by the four sub-questions beneath evaluation question 1 and the three sub-questions beneath evaluation question 2.

1A. RESEARCHER COMMUNICATION OBSERVATIONS

1.1 Almost all cognitive science researchers discussed with visitors the purpose of their study or gave a description of study activities, while few discussed connections to everyday life or overall observations thus far.

The table below summarizes the most common topics of conversation between cognitive science researchers and visitors across sites.

TABLE 6. Most Common Topics of Conversation Between Observed Visitors and Cognitive Science Researchers at Hub Sites (n=63).

Topic of Conversation	# of Groups: MSC	# of Groups: MOS	# of Groups: MCM	# of Groups: OMSI	Total
Description of study activities	15	13	11	15	54
Purpose of study/Research questions	15	13	14	12	54
What kind of data the researcher was collecting	8	6	4	6	24
Differences between study conditions	5	12	1	2	20
Hypotheses	6	1	8	2	17
Scientific relevance or connection to previous studies	3	4	3	0	10
Connection to everyday life or the museum	0	4	1	2	7
Overall observations thus far	1	3	1	2	7

All of the cognitive science researchers' conversations with adult visitors included some aspects of the scientific process. For instance, in at least two thirds of interactions at all sites, visitors and cognitive science researchers discussed the study activities or methods (for instance, "We're going to have your child solve five word problems") and the purpose of the study ("We're hoping to learn how color influences math ability"). Each of these topics came up in 54 of the 63 total observed interactions. Close to half of interactions included a discussion of what the researcher was focusing on (in other words, what data the researcher collected). There was also some natural variety in conversations across sites. Cognitive science researchers at MCM discussed their hypotheses in half of their interactions with visitors, and cognitive science researchers at MSC discussed their hypotheses in just over a third of interactions. In contrast, hypothesis came up in conversation only once at the MOS and only twice at the OMSI. A similar pattern can be seen with "Differences between study conditions," which was discussed in one-third of interactions at MSC and three-quarters of interactions at MOS.

There were some aspects of the scientific process that came up in discussions between cognitive science researchers and visitors rarely or not at all four Hub sites. These topics were scientific relevance, connection to everyday life, and overall observations thus far.

Commonly-discussed aspects of research are likely comfortable for cognitive science researchers to discuss, and may not need additional attention. Descriptions of study activities and the purpose of the research fall into this category. The commonality of these topics is to be expected, since they are often folded into an explanation of the consent process, which is often similar when cognitive science researchers are conducting their research in a university lab setting. Natural variety in conversations is also something to be expected and even desired, such as that seen in discussions of researcher focus, hypothesis, and different study conditions. Variety indicates that cognitive science researchers are tailoring their explanations to each visitor's needs and interest level. In addition, each study is different, and cognitive science researchers may choose to emphasize different aspects.

However, another possibility is that cognitive science researchers are not as comfortable discussing the uncommon topics as they are with some of the more common topics. For instance, additional analysis showed that at OMSI, eight researcher-visitor conversations involved *only* a description of study activities and the research question. If the infrequency in discussion of other topics is related to discomfort, those topics may require some additional attention from program staff or researcher supervisors.

The infrequency may not have been related to discomfort; there are other possibilities as well. Since Living Lab research is in-progress by definition, cognitive science researchers may not have overall observations thus far for a new study and thus did not discuss that aspect of the scientific process. Cognitive science researchers may also have been limited by time and visitor interest. They may also have assumed that some aspects of their study were either readily apparent or not interesting to visitors, and so did not discuss those aspects. However, as the next section explains, practice and experience may improve researcher confidence in communicating with visitors.

1B. RESEARCHER CONFIDENCE IN ABILITY TO COMMUNICATE ABOUT RESEARCH WITH VISITORS

In order to learn whether cognitive science researchers' efficacy beliefs related to communicating about research changed over the course of their first few months of participating in Living Lab, cognitive science researchers were surveyed within the first month of their participation in Living Lab, and after 3 to 6 months of participation.

1.2 Many Living Lab cognitive science researchers expressed some confidence in their abilities to communicate about their research when they were initially starting the program, but self-efficacy was even higher among cognitive science researchers who had participated for 3 to 6 months.

In order to learn about cognitive science researchers' self-efficacy during the course of their initial engagement and participation in Living Lab, cognitive science researchers' self-efficacy was measured at one or two times during their involvement with the Living Lab program: once at the beginning of their participation (cognitive science researchers who had been participating for 1 month or less), and once after approximately 3 to 6 months of participation in the program. Cognitive science researchers—including undergraduate and grad students—were asked a series of questions about their self-efficacy with relation to communicating with public audiences. All cognitive science researchers who had participated in the Living Lab program were invited to take the survey, but cognitive science researchers who had participated in the program for more than 6 months were excluded from these following analyses.

While 51 cognitive science researchers took the survey at the beginning of their participation in Living Lab, only 27 cognitive science researchers who had been participating in Living Lab for 3-6 months took the survey. This difference may be explained in two different ways: some cognitive science researchers may have opted not to take the survey after 3-6 months of participation, and some cognitive science researchers may have left the Living Lab program prior to participating for 3-6 months. Thus, the differences between the self-efficacy of cognitive science researchers as they are initially starting the program and cognitive science researchers who have spent 3-6 months in the program cannot be interpreted as changes in the same group of cognitive science researchers over time. However, these differences do represent differences between cognitive science researchers at the beginning of Living Lab engagement and cognitive science researchers who have more experience conducting research in Living Lab.

The self-efficacy survey contained measures assessing three different types of skills:

- Capacity and comfort communicating with different audiences;
- Confidence describing details of research; and
- Confidence connecting research with daily life.

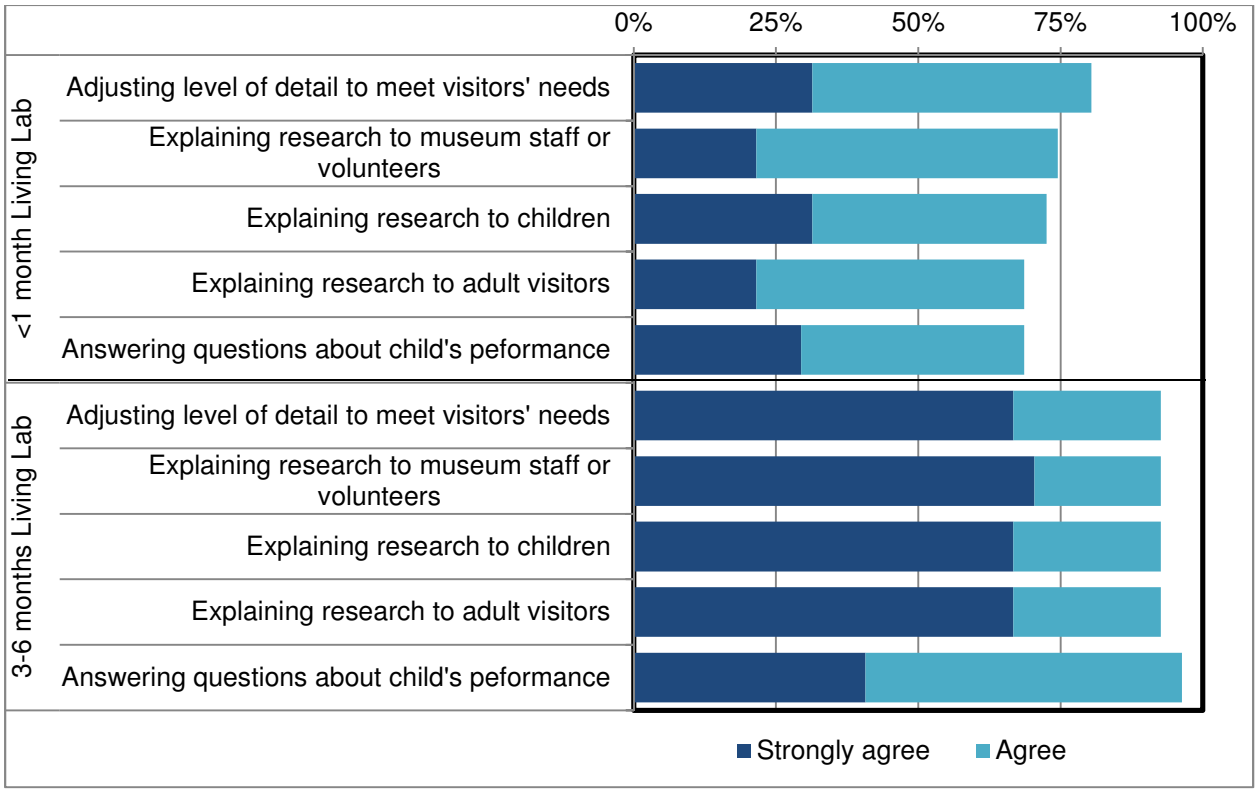
The survey also contained measures assessing cognitive science researchers' attitudes towards communicating about research with the general public. Living Lab cognitive science researchers were asked to rate these statements on a five-point Likert scale, from strongly disagree to strongly agree.

Capacity and comfort communicating with different audiences. Five different statements were used to assess cognitive science researchers' capacity and comfort communicating with different audiences. These statements were:

- I feel comfortable answering any questions a parent has about their child's "performance" in my study.
- When I talk about my research, I can adjust the level of detail I use depending on the visitor's time constraints, background, or interest level.
- I feel confident explaining my research to Museum staff and volunteers.
- I feel confident explaining my research to adult visitors at the museum.
- I feel confident explaining my research to any children in the museum who ask about it.

When surveyed upon beginning their participation in Living Lab, most of the cognitive science researchers (n=51, including undergraduate and graduate research assistants) felt confident in their abilities to communicate with different audiences, with over two-thirds of cognitive science researchers indicating that they strongly agreed or agreed with each of these statements (see Figure 1.).

FIGURE 1. Percent of Cognitive Science Researchers Who Agreed or Strongly Agreed with Statements Related to Confidence in Communicating with Diverse Audiences (n=78).



Longer participation in Living Lab, up to 6 months, was associated with significantly higher overall ratings for these communication measures, when controlling for expertise (number of months of participation in Living Lab)[2]. Two different factors may explain this finding. One factor may be that cognitive science researchers who participate in Living Lab may experience self-efficacy improvements over time, due to experience or the professional development provided through the Living Lab program. Another factor may be that cognitive science researchers who persist with the Living Lab program may include primarily those who feel more confident doing research and communicating about their research in this setting.

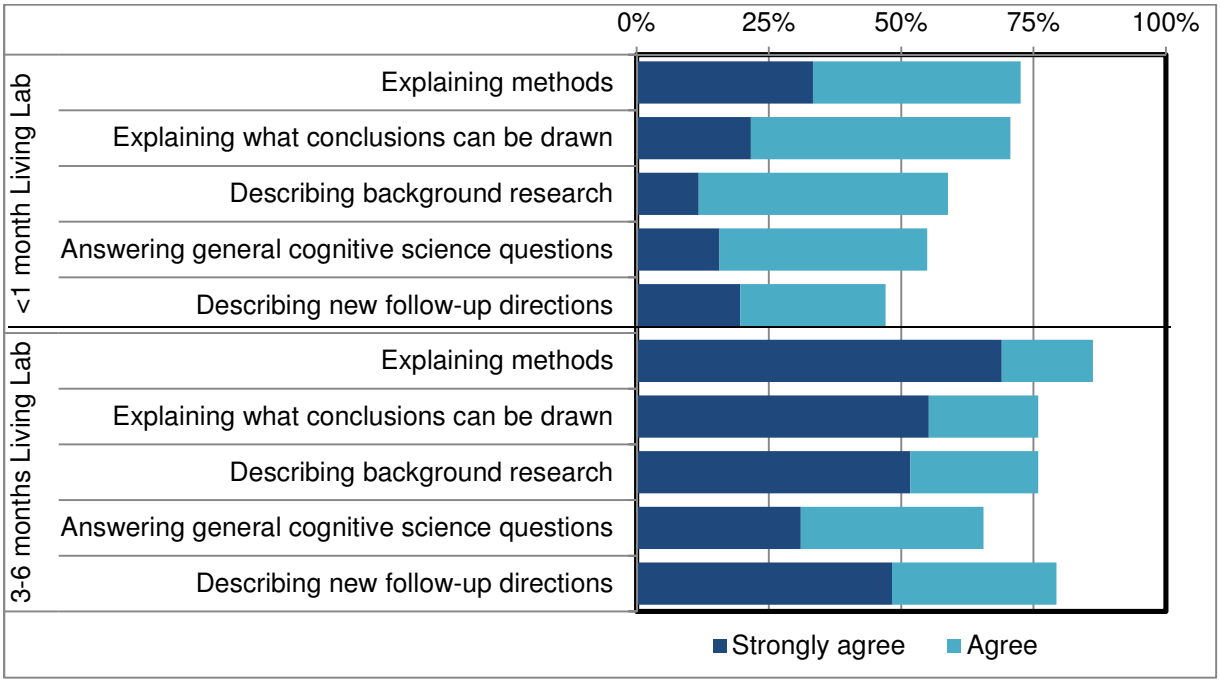
Confidence describing details of research. Five items on the self-efficacy scale focused on cognitive science researchers' confidence describing different aspects of their research to visitors. The five items included:

- I feel comfortable explaining to visitors, staff, and volunteers what conclusions I can and cannot draw from my research.
- I am comfortable explaining the research methods involved in my study.
- I feel comfortable responding to questions about cognitive science in general.
- I can describe the background research related to my study to Museum staff, volunteers, and visitors.
- I can quickly describe one or two new research directions to take that follow from my study.

At the beginning of their engagement in Living Lab, few cognitive science researchers were strongly confident in each aspect of communication about details of research, although a majority or near-majority felt somewhat self-efficacious with regards to each factor (See Figure 2; n=51). Cognitive science researchers expressed the strongest initial degrees of confidence explaining their methods, but lower degrees of confidence describing background research, answering general cognitive science questions, and describing new follow-up directions. Longer participation in Living Lab was associated with higher levels of confidence overall across these factors[3], when controlling for the number of months the research had spent participating in behavioral science research in general. As with the factors related to self-efficacy for communicating with diverse audiences, this finding may be explained by the two different possible factors of cognitive science researchers gaining confidence through the professional development and participation in Living Lab or other learning opportunities, or that cognitive science researchers who have more confidence in this area may be more likely to persist with the Living Lab program.

[2] β=.394; $p<0.001$; n=78, Adjusted R^2 for model=.144
[3] β=.236; p=0.043; n=78; adjusted R^2 for the model=.125

FIGURE 2. Self-efficacy for Explaining the Details of Research: Cognitive Science Researchers who Agreed or Strongly Agreed That They Feel Confident Explaining Different Aspects of Research (n=78).

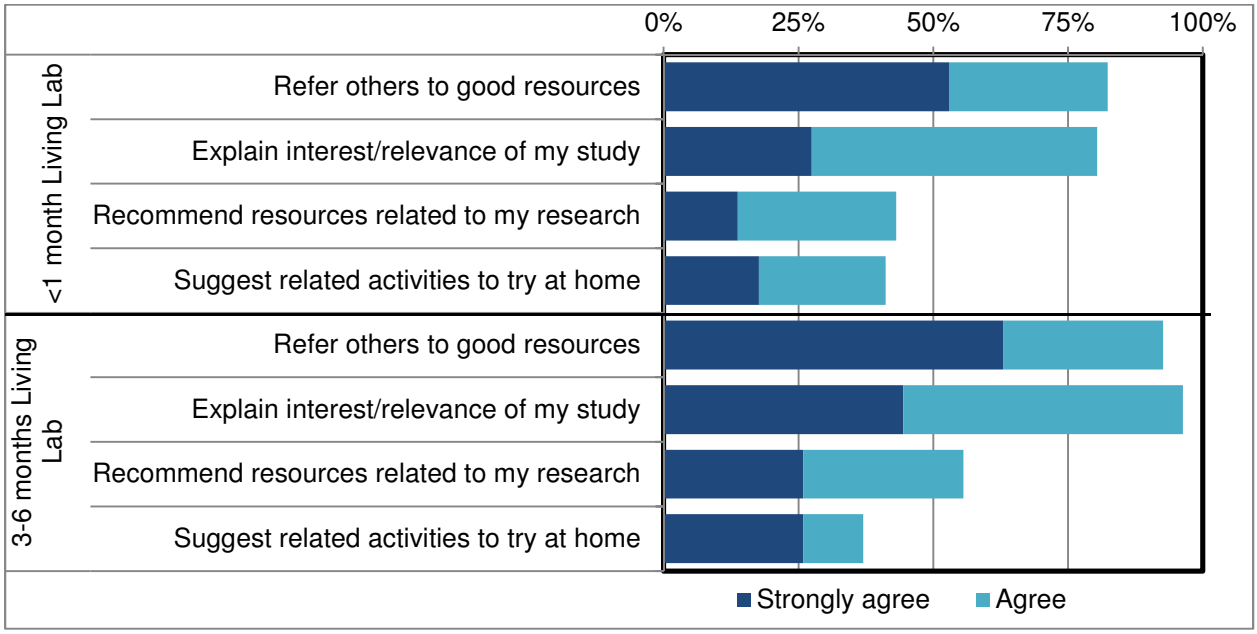


Confidence connecting research with daily life. A self-efficacy scale related to confidence in helping people make connections to or apply research in daily life was also created. This scale included the following four items:

- I can help Museum visitors, staff, and volunteers understand why my study is interesting or relevant in daily life.
- I can recommend further activities for parents/caregivers and children to try at home.
- I can recommend resources, like books or websites, for visitors, staff, and volunteers to learn more about my research or similar research.
- If a visitor, staff member, or volunteer asks a question to which I do not know the answer, I am comfortable referring them to resources that could help.

Among cognitive science researchers who were just starting to participate in the Living Lab program (n=51), fewer than 20% strongly agreed that they could suggest activities related to their research for visitors to try at home, or recommend appropriate resources related to their research. However, over three-quarters of respondents agreed or strongly agreed that they could recommend general resources that could help others answer more general questions about cognitive science, and explain the interest or relevance of their study. There was no significant association between time participating in Living Lab and these factors overall, when controlling for time spent conducting behavioral science research. While cognitive science researchers did have relatively high levels of confidence among many of these factors, this suggests that these are areas that could potentially be improved through additional professional development activities or resources.

FIGURE 3. Percent of Cognitive Science Researchers Who Initially Agreed or Strongly Agreed with Statements Related to Self-efficacy for Making Connections between Research and Other Resources or Activities (n=78).

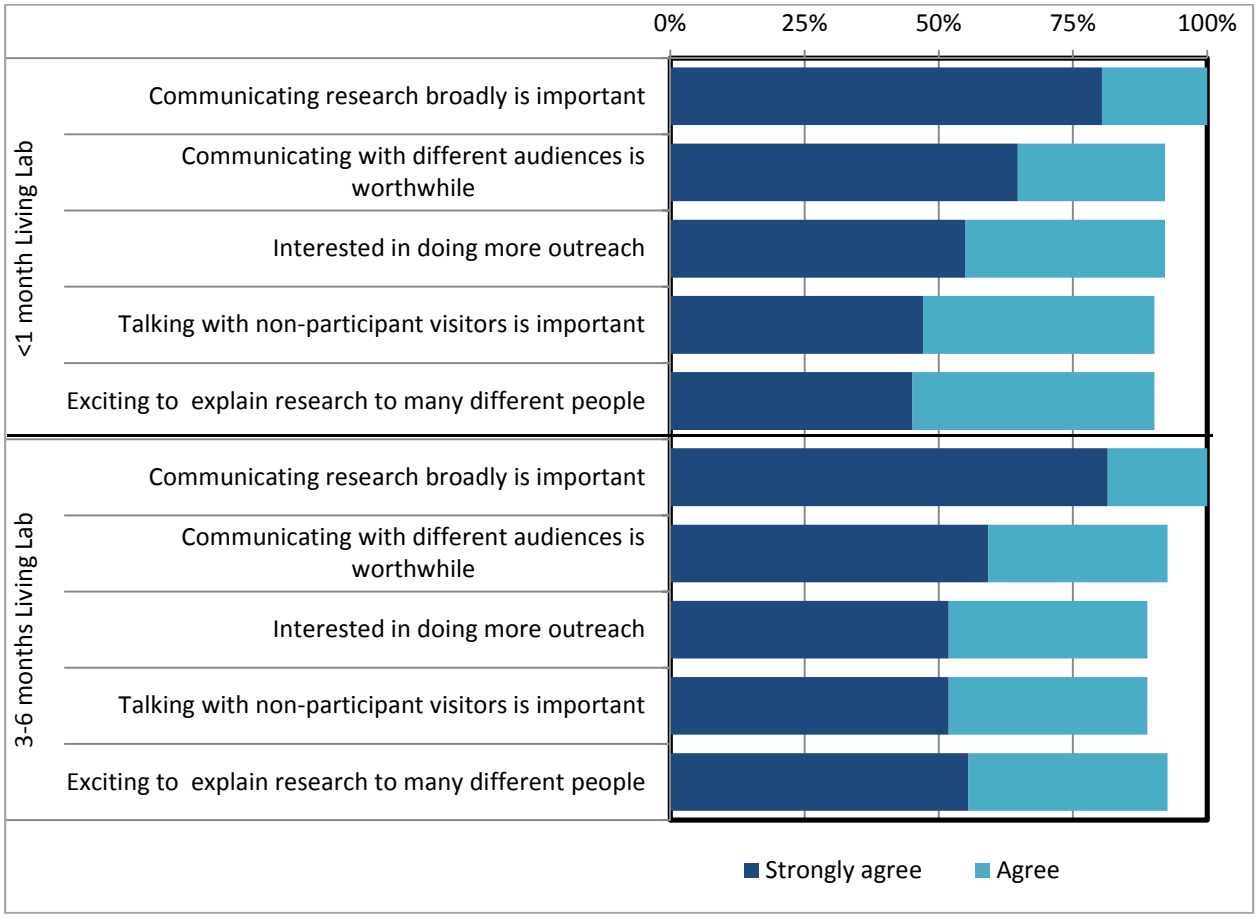


Cognitive science researchers' attitudes towards communicating research to non-scientists. A scale focused on attitudes towards communicating research to non-scientists was created based on cognitive science researchers' responses to the following five statements:

- It is important for me and other scientists to be able to communicate our research to a broader audience.
- I feel excited when I get to explain my research to a lot of different people.
- Communicating with Museum visitors, staff, and volunteers is a worthwhile use of my time.
- I would like to do more science outreach activities in the future.
- It is important to talk with visitors about my research, even if they or their children are not participating in my research.

Cognitive science researchers had strongly positive responses to each of these statements regardless of how much time that they spent with Living Lab, indicating that the cognitive science researchers who become involved with and persist with Living Lab, not surprisingly, have positive attitudes towards communicating about their research with others. In particular, all cognitive science researchers surveyed agreed or strongly agreed that it is important for scientists to be able to communicate about their research to a broader audience. Overall, these attitudes towards communicating science research with broader audiences were not found to be related to time spent in Living Lab. The distribution of responses suggests that cognitive science researchers who are interested and become engaged in Living Lab tend to value communicating with the public.

FIGURE 4. Percent of Cognitive Science Researchers who Initially Agreed or Strongly Agreed with Statements Related to Attitudes Towards Communicating about Research with Diverse Audiences (n=78).



1C. EDUCATOR COMMUNICATION WITH VISITORS ABOUT RESEARCH TOYS

Similar to observations of researcher interactions with visitors, staff at the Hub sites also observed educator interactions with visitors while they used Research Toys together.

1.3 The most common topics of conversation between museum educators and adult visitors during Research Toy interactions were different at each site. The least common topics of conversation were follow-up studies, related activities, cognitive science in general, and relevance of research.

Similar to the way data collectors observed conversations between cognitive science researchers and visitors at Hub sites, they also observed museum educators and visitors while museum educators did interpretations with Research Toys. Because the Research Toys represent completed studies, no data are collected when visitors use them, and therefore there is no consent process for the activity. Museum educators may also tweak the methods to be more conducive to

interpretations on the museum floor. During Research Toy interactions, museum educators do the study activity with the child, and then debrief the adult about the study. Museum educators still talk about different aspects of the scientific process with visitors. The table below shows frequency of discussion for each tracked topic of conversation.

TABLE 6. Most Common Topics of Conversation between Observed Visitors and Museum Educators at Hub Sites (n=62).

Topic of Conversation	# of Groups: MSC	# of Groups: MOS	# of Groups: MCM	# of Groups: OMSI	Total
Findings	15	15	7	11	48
Description of study	12	5	15	15	47
Research questions	13	12	6	11	42
Different conditions	3	15	12	11	41
What data the researcher collected	2	6	7	11	26
Follow-up studies	0	3	0	3	6
Related activities	0	0	0	0	0
Cognitive science in general	0	1	2	1	4
Relevance of research	1	9	1	1	12

This shows a difference from Finding 1.1, the corresponding finding for conversation topics during researcher interactions. In the case of researcher interactions, there were two topics of conversation that were common across sites, but there were no such topics for Research Toy interactions. Part of this may be related to the consent process: cognitive science researchers most commonly discussed research questions and gave a description of the study, the latter of which can easily be part of the consent process. Museum educators are also much more likely to discuss findings during Research Toy interactions than are cognitive science researchers discussing their own in-progress research, since cognitive science researchers may not have any findings to speak of yet.

This also suggests that Research Toy interactions are more variable across sites. Even though all Hub sites typically use similar Research Toy activities, different museum educators will interpret them with visitors in different ways. This is desirable, since it means that museum educators are tailoring their interpretations to visitors' interests and not just repeating a stump speech each time. Some sites may instruct museum educators to emphasize some topics over others or to hit a certain number of main points during the interpretation, or each Hub site may have different educational goals for the Research Toy activities.

The least common topics are all related to broader implications of the research. Topics related to the methods and outcomes of the research were much more commonly discussed. This makes sense, since the Research Toy activities involve doing activities from the actual study, and

museum educators explain those activities. However, it is surprising that museum educators did not often discuss follow-up studies, since the studies represented by Research Toys are completed and may actually have associated follow-up studies. It is possible that museum educators are not aware of the follow-up studies, especially if the cognitive scientist who conducted the original research is no longer in that museum's Living Lab program. Museums may also place emphasis on breadth over depth with Research Toys; for example, museum educators may be more likely to learn a new Research Toy interpretation than learn additional information about an existing one. The above topics may be uncommon because educational interactions can vary in length, or because visitor conversations differ due to time constraints and visitor interest. These topics may also be uncommon because museum educators are not comfortable discussing them.

However, one difference stands out: nine conversations at the MOS included a discussion of the relevance of the research, while only one discussion did at each of the other sites. This suggests that museum educators at the MOS may have been consciously working to discuss the relevance of the research with visitors. The similarities across sites for the least common topics also suggests that natural variations in conversation alone cannot account for these topics not coming up in educational interactions. If the infrequency is related to discomfort, discussion of those topics can be practiced in training sessions.

1D. EDUCATOR COMFORT LEVEL WITH COGNITIVE SCIENCE COMMUNICATION

1.4 Before starting Living Lab, most museum educators felt comfortable with explaining research to different audiences, although some had concerns with talking about cognitive science researchers' methods and answering questions about child development.

In order to learn about museum educators' self-efficacy during the course of their initial engagement and participation in Living Lab, museum educators' self-efficacy was measured at two times during their involvement with the Living Lab program: once at the beginning of their participation (museum educators who had been participating for 1 month or less), and once after 3 to 6 months of participation in the program. All of the 18 museum educators who were newly trained and participating in the Living Lab program – including summer high school and college interns and volunteers – participated at both time points. Thus, while the sample size is small and a paired analysis was not conducted, the initial and final groups are comparable.

The self-efficacy survey contained measures assessing two different types of skills:

- Confidence explaining and understanding child development research studies; and
- Confidence helping visitors connect to and understand the relevance of research studies.

The survey also contained measures assessing museum educators' attitudes towards communicating about Living Lab research with the general public. Living Lab museum educators were asked to rate the items in each category on a five-point Likert scale, from strongly disagree to strongly agree.

Self-efficacy for explaining and understanding child development research. Six different statements were used to measure museum educators' self-efficacy for explaining and understanding child development research. These statements were:

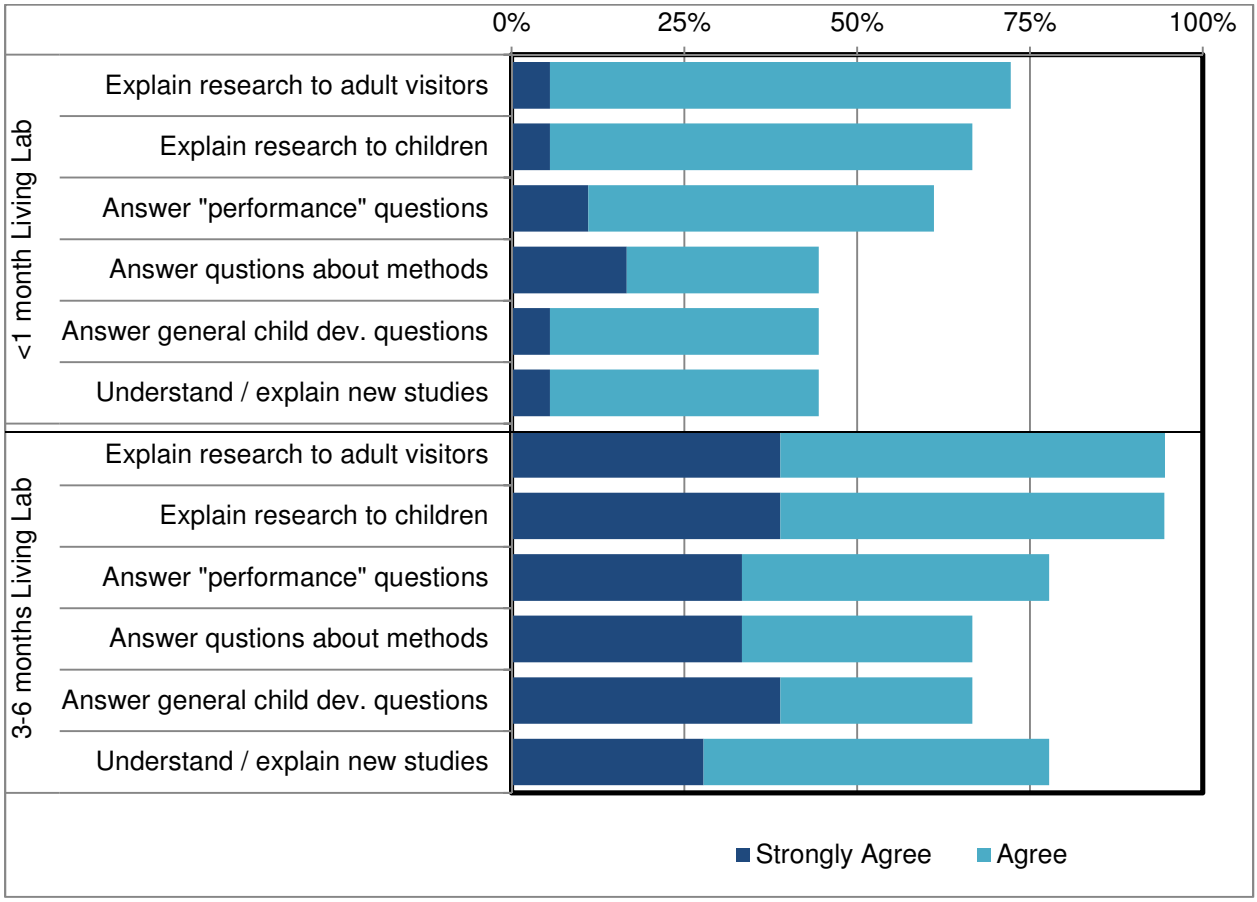
- I feel confident explaining the Living Lab research to adults who visit the museum.
- I feel confident explaining the Living Lab research to any children in the museum who ask about it.
- I feel comfortable answering any questions an adult has about a child's "performance" in the study.
- I feel comfortable answering any questions about the methods used by Living Lab researchers.
- I feel comfortable responding to questions about child development in general.
- When I'm introduced to a new research study, I can quickly help visitors understand it.

Initially, most museum educators agreed or strongly agreed that they felt confident explaining research to adults and children, and that they could respond to questions about a child's performance on a study (See Figure 5). Fewer than half of museum educators felt confident in their abilities to answer questions about methods and to answer general child development questions.

After participating in Living Lab for between 3 and 6 months, museum educators' overall confidence in these areas was significantly higher, suggesting that Living Lab participation and/or professional development helped improve self-efficacy for explaining child development research to different audiences[4].

[4] Mann-Whitney U=75.5; p-0.006; n=36

FIGURE 5. Percent of Museum Educators who Initially Agreed or Strongly Agreed with Statements Related to Self-efficacy for Explaining and Understanding Child Development Research (n=18 for each time point).



1.5 New museum educators may feel less comfortable recommending resources for learning more about Living Lab research.

Three different statements were used to measure museum educators' self-efficacy for helping visitors make connections and understand the relevance of child development research studies. These statements were:

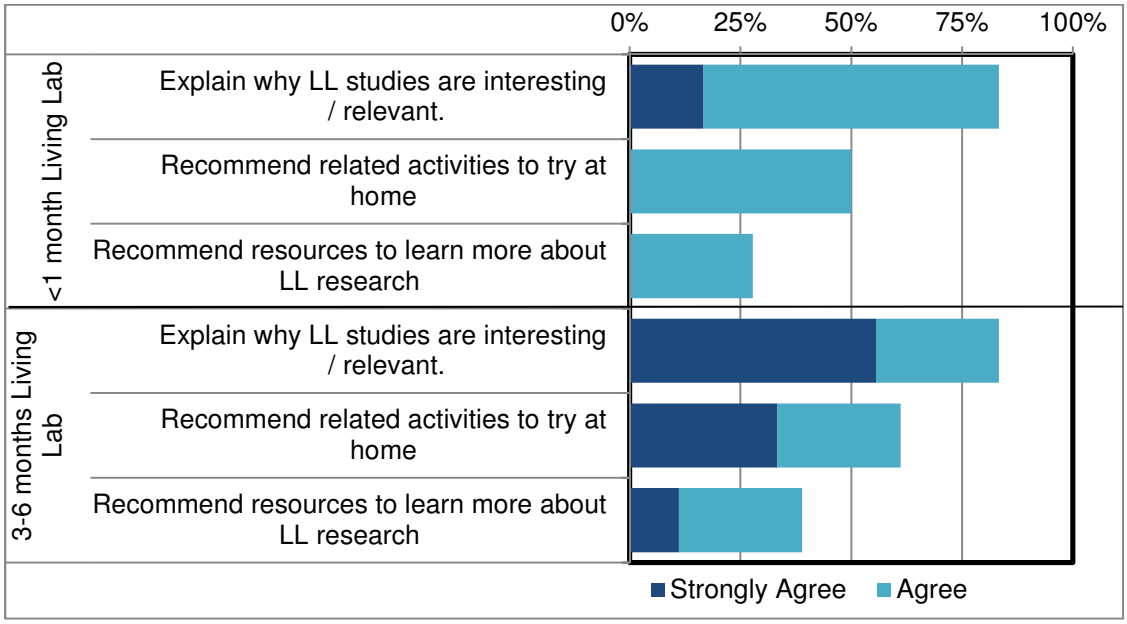
- I can recommend further activities for adults and children to try at home related to the Living Lab research.
- I can recommend resources, like books or websites, for visitors to learn more about Living Lab research.
- I can help parents or staff understand why Living Lab studies are interesting or relevant.

Over three-quarters of museum educators agreed or strongly agreed that they felt confident in their abilities to explain why Living Lab studies were relevant during their initial engagement with Living Lab. The percentage of museum educators who strongly agreed with this statement after participating in Living Lab for several months increased significantly, however, from less

than 20% of museum educators initially to over half of museum educators after a few months of participation.

Only around half of museum educators agreed or strongly agreed that they could recommend further activities for adults and children to try at home related to Living Lab research when they initially started working with the program, although the percentage of museum educators who "strongly agreed" with this statement increased significantly[5] from 0 initially to 28% after several months of Living Lab participation. Finally, over half of museum educators felt neutral or disagreed about their abilities to recommend resources to learn more about Living Lab research to visitors after participating in Living Lab for a few months, suggesting that this may be an area to target for development and improvement. Noting the small sample size, no significant change in educator self-efficacy overall across these measures was observed.

FIGURE 6. Percent of Museum Educators who Initially Agreed or Strongly Agreed with Statements Related to Self-efficacy for Recommending Related Activities and Resources (n=18 for each time point).



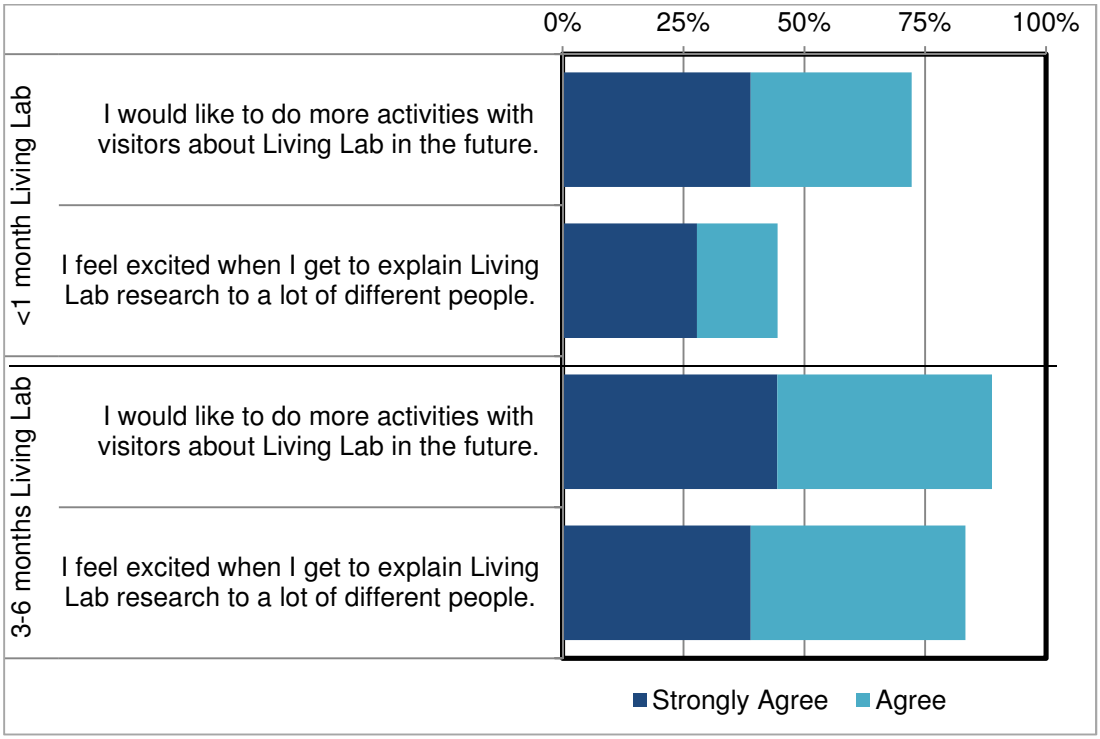
Attitudes towards communicating about Living Lab research. Museum educators were also asked to rate their attitudes towards communicating about Living Lab research with audiences by registering their agreement or disagreement with the following statements:

- I would like to do more activities with visitors about Living Lab in the future.
- I feel excited when I get to explain Living Lab research to a lot of different people.

[5] X^2=.015; p=0.013; n=36

While half of Living Lab museum educators felt neutral about explaining Living Lab research to a lot of different people initially, over 80% agreed or strongly agreed with this statement after participating for a few months in the program (see Figure X)

FIGURE 7. Percent of Museum Educators who Agreed or Strongly Agreed with Statements Related to Attitudes about Doing Living Lab Research Educational Activities (n=18 for each timeframe; 36 in total).



2A. ADULT VISITOR INTEREST AND LEARNING

The following findings are drawn from observations of adult visitors' interactions with their children and during Research Toy interpretations, and interviews conducted after the end of the interpretation, as well as interactions with the cognitive science researchers and the interviews afterward.

2.1 Almost all adult visitors observed their child's behavior during the Research Toy interaction, and at two sites, facilitated the Research Toy interaction as well. Adult visitors were also observant while their children participated in research studies.

Adult visitors interacted with their children during the Research Toy activities in a variety of ways. Data collectors at the Hub sites watched for several specific behaviors during observed Research Toy interactions.

TABLE 7. Adult Visitor Behaviors during Research Toy Interactions (n=62).

Behavior	# of Groups: MSC	# of Groups: MOS	# of Groups: MCM	# of Groups: OMSI	Total
Caregiver observes child's behavior	14	14	14	15	57
Caregiver facilitates Research Toy interaction	10	4	3	10	27
Caregiver asks about study	3	4	3	3	13
Caregiver explains behavior	4	2	3	2	11
Caregiver asks about performance	1	1	3	0	5

"Observing the child's behavior" was by far the most common behavior observed. This is similar to how adults behaved while their children were participating in actual research studies, where almost all adult visitors observed the child's behavior at least part of the time.

TABLE 8. Adult Visitor Observation Behaviors during Researcher Interaction (n=63).

Behavior	# of Groups: MSC	# of Groups: MOS	# of Groups: MCM	# of Groups: OMSI	Total
Caregiver does not observe	0	4	2	0	6
Caregiver observes part of the time	5	4	4	6	19
Caregiver observes all of the time	11	8	9	11	39

Only six groups in total did not observe their child's behavior while participating in the research study at all. Only five groups did not observe their children using the Research Toys. Even though fewer adults asked questions, the high numbers of adults observing shows evidence that adults are engaging with the activities. In two-thirds of groups at OMSI and MSC, parents actually facilitated the Research Toy interaction by repeating the museum educator's instructions, asking probing questions, prompting the child, or helping the child use the Research Toys. This may be due to different interpretation styles at the different sites. However, a caregiver facilitating the Research Toy activity is also evidence of active engagement.

2.2 Most visitors had positive feedback for the cognitive science researchers and were interested in following up. Adult visitors also had positive experiences with the Research Toys, with almost all saying they found the activity interesting and identifying something new they learned.

To get a general sense of how they felt about their interaction with the researcher, adult visitors were asked what the researcher did well, what they could improve, and whether they would be interested in following up. Most visitors across sites gave positive feedback about the researcher's communication.

TABLE 9. Visitor Feedback on Researcher Communication (n=60).

Hub site	# of groups giving positive feedback	# of groups giving suggestions for improvement	Positive feedback example
MSC	13	2	"She was very nice, friendly, and approachable. There was a very open fashion, so you would feel comfortable saying yes or no."
MOS	10	4	"He was fine communicating with me, really great with the story telling, some researchers are better or worse at engaging with kids and this researcher was terrific."
MCM	15	0	"Read sheet about study, communicated well, friendly, talked at his level."
OMSI	12	2	"She was just very gentle and smiling."
All	50	10	N/A

Of the 50 visitors providing positive feedback, 38 visitors' comments centered on friendliness or the fact that the cognitive science researcher made the parent or child feel comfortable. Visitors mentioned that the cognitive science researchers explained the consent process well, and that they felt comfortable because their children would not be identified by name or because the cognitive science researcher told them they could terminate the interaction at any point. At various sites, the cognitive science researchers were described as "polite," "friendly," "smiling," and "not forceful." Some other comments praised the cognitive science researcher's skills with children, such as "very patient," "did well to keep his interest," and "very good with children."

Visitors were also asked if they would be interested in following up on the research study, and prompted to explain how. Almost all visitors at OMSI, MOS, and MSC indicated some sort of interest in following up, with some even saying that they had already scheduled participation in another study. At MCM, half of visitors expressed an interest in following up. The table below summarizes visitor interests in following up. Note that totals add up to more than 60 because visitors sometimes expressed desire to follow up in more than one way.

TABLE 10. Visitor Interest in Following Up on Research Studies (n=60).

Hub site	No interest in following up	General interest in following up	Specific interest in following up: Online	Participate in another study	Other specific
MSC	0	9	5	1	1
MOS	0	5	4	4	2
MCM	7	3	1	2	0
OMSI	1	2	5	3	9
All	8	19	15	10	12

These data suggest that visitors generally feel positive about their interactions with the cognitive science researchers. This is good, since visitors do not generally expect to participate in research studies while at a museum, and some Hub sites have reported concerns about community distrust of scientists, cognitive science researchers, or participating in research as a subject. Since visitors were approached to participate in the study, they respond first to that interaction. Along with that, it is interesting to note that most visitors who gave positive feedback mentioned the comfort aspect, not the cognitive science researchers' particular communication techniques. This comfort aspect is important; after all, if you have trouble understanding something, you are not likely to be comfortable with it. However, since most visitors did not give direct feedback about the cognitive science researchers' communication styles or research communication skills, it is difficult to infer more specific details about it.

For the Research Toy interpretations with museum educators, almost all adult visitors said that they found the Research Toy activity interesting. Visitor comments suggest that their interests fall into several categories.

TABLE 11. Adult Visitor Interest in Research Toys (n=61).

Visitor interest	# of Groups: MSC	# of Groups: MOS	# of Groups: MCM	# of Groups: OMSI	Total
Visitor was interested in the activity	14	13	15	16	58
Interested in observing child	8	10	10	11	39
Interested in behavioral implications	2	7	4	2	15
Other	3	3	1	3	10
Visitor was not interested in the activity	1	2	0	0	3

Not surprisingly, most visitors' interest centered on watching their children. However, some are extending their interest to behavioral or cognitive science-related topics. For instance, one parent who used the "Stickers" Research Toy at MCM said, "I wonder how much boy versus girl stickers affects it. She really looked through and only kept the stickers that were more girly." Another visitor at MOS was interested in "observing how play is learning."

A majority of visitors also indicated that they learned something new from the activity.

TABLE 12. Adult Visitor Learning from Research Toys (n=61).

Visitor learning	# of Groups: MSC	# of Groups: MOS	# of Groups: MCM	# of Groups: OMSI	Total
Visitor learned something new	12	9	11	10	42
Insight into child's behavior	4	4	10	4	22
New things about teaching and learning	5	3	0	1	9
Research outcomes	3	5	0	5	13
Other	0	0	1	0	1
Visitor did not learn anything new	3	6	4	6	19

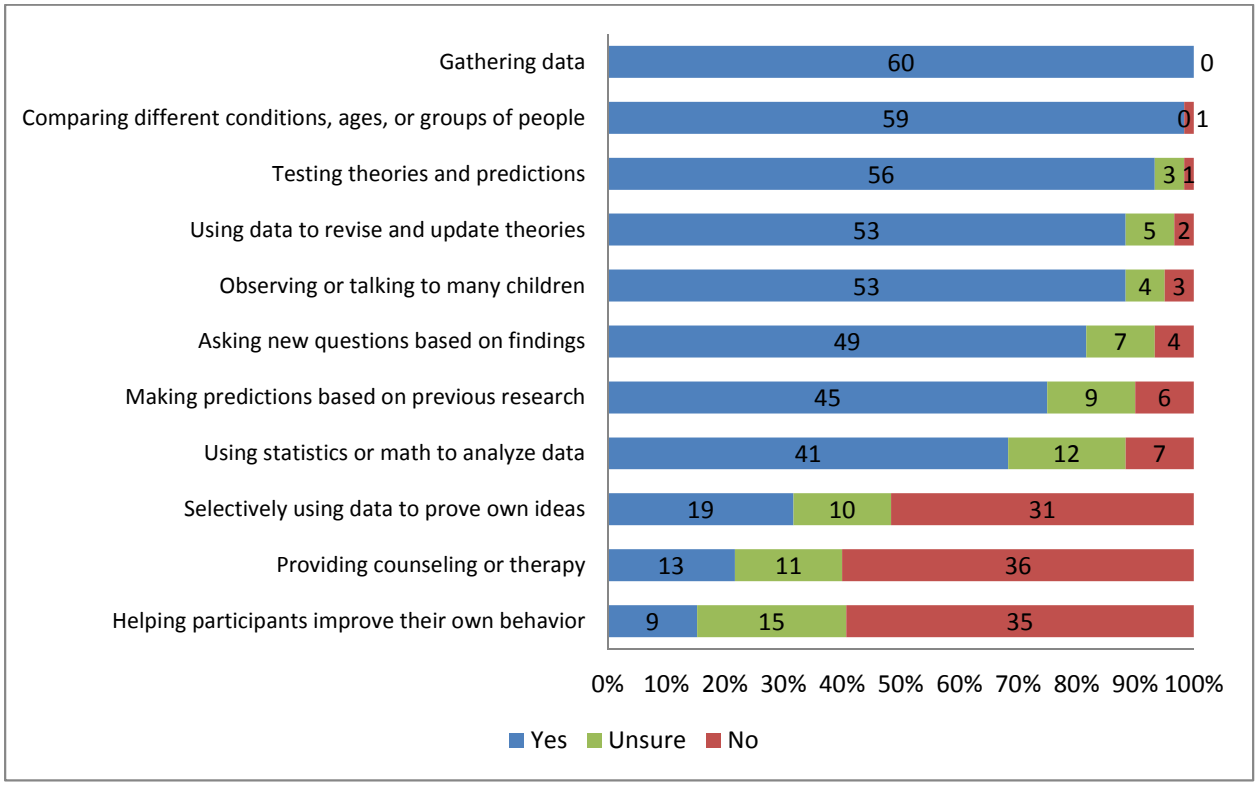
Although only three adult visitors said they did not find the activity interesting, 19 said they did not learn anything new. Most visitors who said they did not learn anything new also gave no explanation for why not, but of those who did, answers ranged from not being able to watch the activity to already being familiar with the material.

2B. ADULT VISITORS' UNDERSTANDING OF COGNITIVE SCIENCE

2.3 Adult visitors who interacted with cognitive science researchers or museum educators recognize that psychology researchers engage in the scientific process, but they may still have some misconceptions about psychology as a science.

At the beginning of each cognitive science researcher interaction exit interview, visitors were presented with a list of activities and asked to select which ones were parts of the cognitive science researcher's study and which were not. They were also provided with an "Unsure" option. The list included some science process activities directly observable in Living Lab, some science process activities not directly observable in Living Lab, and some common misconceptions about psychology as a science.

FIGURE 8. Visitor Responses to the Question "Which of the Following Activities Do You Think Are Part of the Researcher's Study Before, During, or After What You Took Part in or Observed Today?" (n=60).



As is apparent from the table above, visitors were all or almost all able to identify the directly observable science process activities (Gathering data; Comparing different conditions, ages, or groups of people; and Observing or talking to many children) as activities that cognitive science researchers were doing, had done, or would do. This is not surprising, as visitors likely saw the cognitive science researchers doing at least one of the three directly observable activities during their interaction.

Visitors were also generally able to identify the science process activities that were not directly observable as activities that the cognitive science researchers had done, were doing, or would do. These activities were: Testing theories and predictions; Using data to revise and update theories; Asking new questions based on findings; Making predictions based on previous research; and Using statistics or math to analyze data.

However, there was more uncertainty about some of these activities, in particular the use of statistics to analyze data and making predictions based on previous research. 18 visitors across sites were either unsure if cognitive science researchers used math and statistics to analyze data or said they did not. 15 visitors across sites also answered either "no" or "unsure" when asked if the cognitive science researchers were making predictions based on previous research. This may indicate that visitors have some uncertainty about these aspects of the scientific process as it

applies to psychology research. Some visitors have answered "unsure" because they were aware that not all studies involve the use of statistics or math for data analysis, though many studies do.

In general, though, visitors identified all the science process activities as parts of the cognitive science researcher's study, indicating that they understood that Living Lab cognitive science researchers are scientists who are conducting scientific research. This is a positive finding, but it cannot be said whether or not visitors came to this understanding as a result of their participation in Living Lab. It is possible that they came into the interaction with the understanding already intact.

There was also some uncertainty apparent in the items that were not part of the scientific process or those that were misconceptions about psychology. Eight visitors at both OMSI and MCM and 19 visitors total said that the cognitive science researcher would be, had been, or was "selectively using data to prove their own ideas." An additional 10 visitors were unsure. Selectively using data to prove one's own ideas is explicitly not part of the scientific process, and considered highly unethical. This misconception may be drawn from news about psychology research and its "reproducibility problem," especially related to studies about goal-priming, and the well-known publishing bias toward statistically significant research results (Satel, 2013). Goal-priming refers to, in Satel's (2013) words, the phenomenon where subjects "automatically and unintentionally alter their thoughts or behavior when prompted by various kinds of information." Certain experiments on goal-priming have been difficult to reproduce, such as one where subjects primed with words associated with older people ("Florida," "bingo," "wrinkle") walked more slowly down a hallway than those who were not. Visitors may be aware of some of the issues that psychology researchers are currently facing, and their awareness may be reflected in their answers. It is important to re-emphasize that these misconceptions are *not* likely to be a reflection of individual cognitive science researchers' behavior. However, since cognitive science researchers (and museum educators) get the opportunity to interact one-on-one with visitors, they may have opportunities to address these misconceptions.

There was also more uncertainty regarding two common misconceptions about psychology, with 25 visitors either unsure or saying that the cognitive science researcher was providing counseling or therapy, and 26 visitors either unsure or saying that the cognitive science researchers were helping children improve their own behavior. Two visitors at OMSI chose to give explanations for their selections:

- *"Everything, really…gathering data about ages/emotions could lead to developing new therapy stuff." –Group 11, OMSI*
- *"Just sitting down with a kid like this could be a great basis for counseling." –Group 15, OMSI*

These visitor responses suggest that people may be thinking more broadly about the "Other activities," thinking that psychology research may be related to development of new therapy techniques. Indeed, some psychology research can be used to develop new techniques for therapy or counseling. However, this is only one possibility. Some visitors may not recognize that what Living Lab cognitive science researchers can contribute to a broader scientific knowledge base with applications beyond therapy. It is unlikely that any particular cognitive

science researcher or researchers gave visitors this misconception, but it does speak to a pattern that researchers may want to be aware of when communicating their research to the public.

Visitors were then asked to choose **two** activities they saw the cognitive science researcher doing that day and explain them. Visitors most often chose "Gathering data" and "Observing or talking to many children."

TABLE 13. Activities Visitors Saw the Cognitive Science Researchers Doing (n=60).

Behavior	MOS	OMSI	MSC	MCM
Gathering data	12	12	7	11
Observing or talking to many children	11	7	8	5
Testing theories and predictions	2	1	4	5
Comparing different conditions, ages, or groups of people	1	6	4	3
Selectively using data to prove own ideas	0	0	0	2
Using data to revise and update theories	0	1	2	1
Asking new questions based on findings	0	0	1	0
Making predictions based on previous research	0	1	1	0
Providing counseling or therapy	0	1	0	0

Since "Gathering data" and "Observing or talking to many children" were two of the three directly observable science activities, it is not surprising that visitors chose to discuss these.

After Research Toy interactions, adult visitors were asked about their understanding of what the cognitive science researchers wanted to find out and how they studied it. Almost all visitors were able to identify the research question, and many identified more pieces of the study. Visitor responses are summarized below and could fall into more than one category.

TABLE 14. Adult Visitors' Understanding of Research Studies Replicated by Research Toy Activities (n=61).

Study aspects identified	# of Groups: MSC	# of Groups: MOS	# of Groups: MCM	# of Groups: OMSI	Total
Purpose of research or research question	14	12	14	16	56
Research methods	1	5	0	4	10
Research outcomes	2	5	0	4	11
Other	0	2	1	0	3

All but five adult visitors identified the research question or the purpose of the research, and those five all identified other aspects of the study. This suggests that museum educators are effectively communicating the basic aspects of the research studies on which their Research Toys are based. However, there may be opportunity for communication of concepts beyond the research question. Only ten visitors mentioned methods, even though the interview question prompted visitors to explain how the cognitive science researchers conducted the study.

2.4 Though it was not a common topic of conversation with cognitive science researchers or museum educators, most adult visitors identified a way in which the research, either from the Research Toys or the in-progress research, was relevant to their own lives when asked after their educational experience.

As noted in Finding 1.1, relevance of the in-progress Living Lab research to everyday life was one of the least common topics of discussion between visitors and cognitive science researchers across sites. However, when prompted to think about relevance, almost all visitors were able to make at least one connection between the research and their everyday lives. The table below shows responses related to relevance of the research from visitors who interacted with cognitive science researchers.

TABLE 15. Post-Researcher Interaction Visitors' Perceptions of Relevance of Research (n=60).

Hub site	# of visitors finding research relevant	# of visitors finding research not relevant
MSC	14	1
MOS	13	1
MCM	14	1
OMSI	16	0
All	57	3

Visitors gave a variety of reasons for the research being relevant, usually relating the research to their own child or children. Visitors' most common answers are summarized below. Note that visitors' responses could fall into more than one category.

TABLE 16. Post-Researcher Interaction Visitors' Reasons for Relevance of Research, Cross-site. (n=57)

Reason for relevance	# of visitors	Example quote
This research helped me learn about improving teaching or parenting strategies.	24	"Well, I'm trying to help him read. I like to read child development books and find out information from there. It would be useful if this was in the book one day."
This research helps me to learn more about understanding my own children or interacting with them.	21	"Helps me understand the ways she sees the world differently than I do, tailor explanations to fit her worldview."
This research helped me learn about how children learn and interact with the world.	12	"Better understanding how children observe things especially in that young age/emotional processing…"
This research is relevant to my own learning.	5	"Look out what they try to sell you for commercials and try to analyze what is helpful to buy and what not."
Research was relevant in helping the children or parents become aware of social / behavior cues	5	"Very relevant. Helps children learn about the importance of body language and how to get attention."
Other	1	"Sorting and matching toys."

Not surprisingly, many caregivers said the relevance of the research was about their own children. However, a few more said the research was relevant to teaching or parenting strategies. There is some overlap there, but it is interesting to note that so many caregivers also made a deeper connection beyond those relating to their own children.

Caregivers' ability to find relevance in the research is surprising in another way. Recall from Finding 1.1, only 7 of the 63 total groups discussed relevance to everyday life or the museum. However, 57 of 60 groups interviewed were able to identify a way that the research was relevant to them. This can suggest several things. Visitors may not have been actively thinking about the relevance of the research until prompted, and cognitive science researchers may not have touched on it during their conversations due to time constraints or focus on other topics. Some research studies have more apparent relevance than others. For example, one study at the Museum of Science, Boston investigated children's willingness to share stickers with a child they had never met. The concept of sharing is immediately relevant in school and home situations, so caregivers may have seen the immediate relevance of a study about sharing and not felt the need to ask the cognitive science researchers about it. In any case, it seems that caregivers are not encountering great difficulty when thinking about how cognitive science research in Living Lab might be relevant to their own lives. Thus, it might be of no great concern that cognitive science researchers don't often directly discuss relevance.

Similar to what was found for cognitive science researcher interactions, few visitors at the Hub sites (aside from the MOS) discussed the relevance of the research. However, when prompted, almost all interviewed visitors identified a way that the research was relevant to their own lives.

TABLE 17. Adult Visitors' Assessment of Relevance of Research Toys (n=61).

Relevance of research	# of Groups: MSC	# of Groups: MOS	# of Groups: MCM	# of Groups: OMSI	Total
Visitor found research relevant	13	11	10	13	47
Understanding/ interacting with my own child	2	11	3	11	27
Improving teaching or parenting strategies	5	1	1	2	9
Learning how children interact with the world	3	4	1	7	15
General/other	3	1	5	3	12
Visitor did not find research relevant	2	3	5	2	12
Unsure	0	1	0	1	2

Adult visitors' ability to find relevance in the research presented in the Research Toys is interesting in much the same way as for the in-progress research. Recall from Finding 1.3, only 12 of the 62 total groups observed discussed relevance to everyday life or the museum, nine of those at MOS. However, 47 of 60 groups interviewed were able to identify a way that the research was relevant to them. In the case of the MOS, seven of the 11 groups who said the research was relevant to them were also groups where the educator had discussed relevance of the research during the interpretation. Of the remaining two groups with whom the educator discussed relevance of the research, one did not complete the interview, and one was not sure.

This difference can suggest several things. Visitors may not have been actively thinking about the relevance of the research until prompted, and museum educators may not have touched on it during their conversations due to time constraints or focus on other topics. Some research studies have more apparent relevance than others. In any case, it seems that caregivers are not encountering great difficulty when thinking about how cognitive science research might be relevant to their own lives.

IV. CONCLUSION

Year 1 formative evaluation focused on visitor interactions with cognitive science researchers and museum educators, as well as assessments of cognitive science researcher and museum educator confidence. Additional formative evaluation also focused on the Essential Elements of *Living Laboratory*® and the different ways that each Hub site was achieving them.

Observing and interviewing visitors showed that, overall, visitors are having positive experiences with museum educators and cognitive science researchers in *Living Laboratory.* Most find the activities interesting, learn something, and express interest in following up in some way. They are engaging in the activities and, in most cases, finding relevance in the research they learn about. Surveys of cognitive science researchers and museum educators show that longer participation in the program correlates with greater confidence in communicating about cognitive science research with diverse audiences.

These formative data also show the flexibility of the *Living Laboratory* model. Formative evaluation shows that Hub sites are constructing their programs in different ways, but that each program is still consistent with the Essential Elements presented in the introduction to this report. For instance, all Hubs are partnering with at least one lab in an academic institution that is running active studies at the Hubs. MOS, the longest-running Living Lab program, has established partnerships with many different labs and institutions. Other Hubs may partner with only one institution or lab and find that all their educational and collaborative goals are met.

Even though Hubs differ in their locations, choices of academic partners, visitation patterns, and more, formative evaluation has also revealed consistent patterns. Several common and uncommon topics of conversation were similar across sites. Almost all cognitive science researchers discussed the purpose of the study and gave a description of the study activities, while few discussed their observations thus far. These similarities are not surprising, nor do they necessarily point to a need for a change to the program. The *Living Laboratory* model assumes variations across conversations. Some aspects of visitor learning were also consistent across sites. Visitors almost all identified directly observable science processes as things the cognitive science researcher did, was doing, or would do. After using the Research Toys, almost all visitors were able to identify the research question of the study they learned about.

Other similarities and differences may require additional attention or modifications in program implementation. Program staff has been responsive and quick to act on findings throughout Year 1, and so as of this writing, many of the recommended changes have already been implemented. However, as a manner of record-keeping, it is still important to note some of the findings that have led or will lead to changes in the program.

For instance, cognitive science researchers did not often discuss the relevance of their research with visitors. Even though visitors were finding relevance anyway, at least two sites (MCM and MSC) began planning ways to address relevance more often in conversations. Especially in combination with the finding that over three-quarters of cognitive science researchers said they already felt confident explaining the relevance of their research, this is one issue that may be able to be addressed with minimal additional professional development. On the educator side, there

was evidence that new museum educators did not feel comfortable answering visitor questions about child development or about cognitive science researchers' methods. While their ratings had improved after 3-6 months, Hub sites (MSC in particular) are considering additional trainings to help museum educators become more comfortable with child development content.

While adult visitors seem to be leaving with positive impressions and new information, they may also be carrying some misconceptions. Exit interviews after cognitive science researcher interactions showed that while visitors are recognizing Living Lab cognitive science researchers as doing science activities, some may also have misconceptions about psychology or child development research. In particular, close to half of visitors answered "no" or "unsure" when asked if cognitive science researchers were selectively using data to prove their own ideas, providing counseling or therapy, and helping children improve their own behavior. Living Lab cognitive science researchers and museum educators will want to be aware of these misconceptions when explaining research.

Adult visitors seem to be getting the content messages from interactions with cognitive science researchers and museum educators, but there may be room for raising awareness of broader ideas. For example, visitor interest in Research Toys was due to interest in observing their own child, and the most common thing visitors said they learned about was something about their own child's behavior. While this is expected and positive, it shows that Living Lab museum educators and cognitive science researchers could make more connections to relevance, broader implications, and child development research in general. Making these connections may also help visitors correct some of the aforementioned misconceptions about psychology/child development research. Some of the Hub sites (MOS in particular) have started instructing museum educators to discuss relevance more in Research Toy interactions. OMSI has also asked cognitive science researchers to try to talk about *Living Laboratory* in general and why it is happening at OMSI, which will give visitors context for the cognitive science researchers' presence in the Museum.

Overall, the program model allows for great flexibility, which will serve it well as Hubs begin to disseminate the model to new partners. The National Living Lab project team at the MOS has a built-in strategy for dealing with program modifications on a case-by-case basis, called the Living Lab Toolkit. The Toolkit is posted on livinglab.org, the program's "Virtual Hub," and is accessible to all participants who register on the site. Some example Toolkit items are guides for using existing Research Toys, tips for initiating collaborations, and formative evaluation tools. Toolkit items are often developed based on formative evaluation findings. As the program moves into Year 2, formative evaluation will focus on mutual professional development efforts at each Hub site, looking at efficacy of educator trainings, cognitive science researcher communication, and expanding the program to broader public audiences.

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APPENDIX A: RESEARCHER-VISITOR OBSERVATION

Date:_____ Evaluator Initials:___ Study name:_____

Visitor group composition, *including study participant and interviewee*	**Children (#)**	**Adults (#)**

Description of researcher (Check all that apply):

❒ High School student ❒ Undergraduate student ❒ Graduate student
❒ Post-doctoral researcher ❒ Professor ❒ Other_____

Behaviors: *In your notes, use A: to indicate what the adult caregiver is saying or doing, C: to indicate the child, and R: the researcher*

Prior to child's participation (check all that apply)

❑ Researcher explains consent form and details of participation
❑ Caregiver(s) asks questions about research study or consent process (please note questions)
❑ Visitor is an educational opportunity only (i.e. not eligible for inclusion as study data)

During the study (check all that apply)

Caregiver(s) observes child's participation / behavior

❑ Not at all ❑ Part of the time ❑ Most/all of the time

❑ Caregiver makes comments or asks questions *(please note specifics below)*

Before, during, or after the study:

Researcher, caregiver(s), and/or child discuss:

- ❑ Purpose of study / research questions
- ❑ Scientific relevance or connection to previous studies

Design of study:

- ❑ Hypotheses (what do participants or researchers think will happen and why)
- ❑ Description of study activities
- ❑ What the researcher was focusing on (i.e. what evidence the researcher was recording)
- ❑ Differences between study conditions (i.e. with and without videos) or groups (i.e. males / females, different ages)

- ❑ Overall observations thus far (i.e. what trends have the researchers noted during the trial)
- ❑ Connection to everyday life or museum

❑ Caregiver asks about the performance of child, or requests a diagnosis (i.e. Does this mean he's autistic? Did she do better than the other kids her age?) (*Please note question and researcher's response)*

Notes (conversations, questions, etc.) Note why caregiver leaves or ends the interaction.

APPENDIX B: RESEARCHER-VISITOR POST-INTERACTION INTERVIEW

Did the visitor give consent to be interviewed?

❒ No ❒ Yes

If no, thank the visitor, then explain their refusal briefly below. ***If yes***, continue to the next question.

What is your relationship to the child or children you came with today?

❒ Parent or guardian ❒ Grandparent ❒ Other relative (cousin, aunt, uncle, brother) ❒ Sitter/nanny/Au Pair ❒ Teacher ❒ Other

1. **What you observed today was part of the research process**. *[Hand visitor list of activities]* **Which of the activities on this list do you think are part of this researcher's study, including activities happening before, during, or after what you observed today? If you're not sure, just check off that column instead.**

From the activities you checked off, can you tell me about **two** that **<u>you observed the researcher doing today</u>**?

[activity 1]:

[activity 2]:

2. **We'd love to hear any feedback you have about how the researcher communicated with you. Was there anything he/she did well? How could he/she improve?** *[Probe: Was anything confusing or hard to follow? Was the information they told you about the study before you started clear]*

3. **If you have the opportunity, would you follow up online, participate in another study, look up more information about this study, or talk with friends or family about the study? Please explain.**

4. **How do you think this research might be relevant to your everyday life?** *[Probe: What kinds of things could you do or observe with your child related to this research?]*

5. **Do you have any additional questions about this study or about child development research in general?**

Thank you for your participation!

Which of the following activities do you think are part of researcher's study before, during, or after what you took part in or observed today?

	Yes	No	Not sure
Making predictions based on previous research			
Observing or talking to many children			
Providing counseling or therapy			
Gathering data			
Testing theories and predictions			
Helping participants improve their own behavior			
Comparing different conditions, ages, or groups of people			
Using data to revise and update theories			
Selectively using data to prove own ideas			
Using statistics or math to analyze data			
Using common sense to explain behavior			
Asking new questions based on findings			

APPENDIX C: RESEARCH TOY OBSERVATION

Date:_____ Evaluator:___ Research Toy:_____

Visitor Group composition:	Children (#)	Adults (#)

Facilitator's role at the museum

❒Volunteer ❒ Intern ❒ Staff ❒ Other:

Behaviors: *In your notes, use A: to indicate what the adult caregiver is saying or doing, C: to indicate the child, and R: the researcher*

Educator, caregiver, and/or child discuss:

- ❑ Research questions
- ❑ Description of study (i.e. what the participant will do)
- ❑ What the researcher was focusing on (i.e. what evidence the researcher was recording)
- ❑ Different conditions or groups (i.e. with and without instructions; differences between ages or genders)
- ❑ Predictions/Theories (i.e. what the researcher or participant thought will happen and why)
- ❑ Findings
- ❑ Relevance of the research or why it is interesting
- ❑ Cognitive science / Child development research in general
- ❑ Related activities to do at home / in the museum
- ❑ Follow-up research studies or related work

❑ Caregiver asks questions:

- ❑ About study (please note)
- ❑ About performance *(i.e. How did I do? Did my child do it correctly?) Please note both questions and educators' responses below)*

❑ Caregiver facilitates child's interaction with research toys

❑ Caregiver observes child's behavior with toys

❑ Caregiver explains child's behavior (i.e. "Tim always chooses the red toys" or "He's testing all of the blickets to figure out how they work.") *Please record what the caregiver says.*

Notes (conversations, interesting observations, questions, etc.)

APPENDIX D: POST-INTERPRETATION RESEARCH TOY INTERVIEW

Did the visitor give consent to be interviewed?

❒ No ❒ Yes

If no, thank the visitor, then explain their refusal briefly below. ***If yes***, continue to the next question.

What is your relationship to the child or children you came with today?

❒ Parent or guardian ❒ Grandparent ❒ Other relative (cousin, aunt, uncle, brother) ❒ Sitter/nanny/Au Pair ❒ Teacher ❒ Other

Interview related to interaction with educator:

1. **As the educator mentioned, this was an activity that was created as part of a research study. What is your understanding of what the researcher wanted to find out, and how did he/she studied it?**

2. **From your perspective, was this activity and discussion interesting? Yes / No**
   a. *If yes: What was the most interesting thing about this activity, to you?*
   b. *If no: Why not? (or, tell me more.)*

3. **Did you learn anything new from this activity and discussion? Yes / No**
   ***[If yes:** Probe: What kinds of things did you learn?]*

4. **Did this study raise any questions for you about how people think or act?** *[Probe: Did the study make you wonder about any other aspects of your thinking, your child's thinking, or other peoples' thinking?]*
   Yes / No
   a. *[If yes]: Can you say a little more about your thoughts and questions?]*

5. **Was this study relevant to you? Yes / No**
   a. *[If yes] how so?*
   b. *[If no] why not?*

6. **What would you suggest to help us improve this activity? [Probe:** *Was anything confusing or frustrating for you or your child?]*

Thank you for your participation!

APPENDIX E: RESEARCHER SELF-EFFICACY SURVEYS

1. What is your position in your current research lab? You may select more than one.

Undergraduate student	**Graduate Student**	**Postdoctoral researcher**	**Professor**	**Other faculty**
Administrator, program or department manager	**Outreach coordinator**	**Research Assistant**	**Other (specify):**	

2. Prior to participating in Living Lab, how often did you talk about the research you are conducting to the general public? (e.g. participating in an outreach organization; writing in a blog; talking with reporters for a school, community, or national newspaper; writing for a newsletter, etc.)

Never— Living Lab is the first time	**Rarely— Only once or twice before**	**Sometimes— A couple of times a semester**	**Often— About once a week**	**All the time— More than once a week**

3. How long have you been involved in conducting behavioral science research in general?

4. How long have you been participating in the Living Lab program with your current research lab?

5. Have you ever participated in Living Lab before?
   Yes **No**

6. For the next [X] questions, please mark on the scale how much you agree with the statement on the right. For the purposes of this survey, "my research" refers to the research you are helping to conduct while at your Living Lab site.

Audience

I feel confident explaining my research to Museum staff and volunteers.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel confident explaining my research to adult visitors at the museum.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel confident explaining my research to any children in the museum who ask about it.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

In the Museum:

I feel comfortable answering any questions a parent has about their child's "performance" in my study.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel comfortable explaining to visitors, staff, and volunteers what conclusions I can and cannot draw from my research.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I can recommend further activities for parents/caregivers and children to try at home.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

I am comfortable explaining the research methods involved in my study.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I can recommend resources, like books or websites, for visitors, staff, and volunteers to learn more about my research or similar research.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I can quickly describe one or two new research directions to take that follow from my study.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
If a visitor, staff member, or volunteer asks a question to which I do not know the answer, I am comfortable referring them to resources that could help.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel comfortable responding to questions about cognitive science in general.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I can help Museum visitors, staff, and volunteers understand why my study is interesting or relevant in daily life.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
When I talk about my research, I can adjust the level of detail I use depending on the visitor's time constraints, background, or interest level.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I can describe the background research related to my study to Museum staff, volunteers, and visitors.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Interest:

It is important for me and other scientists to be able to communicate our research to a broader audience.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel excited when I get to explain my research to a lot of different people.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Communicating with Museum visitors, staff, and volunteers is a worthwhile use of my time.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I would like to do more science outreach activities in the future.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
It is important to talk with visitors about my research, even if they or their children are not participating in my research.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

[The following four questions appear only in the post version of the survey.]

7. For you, what do you like **most** about talking about your research with museum visitors and staff and volunteers? Please explain.

8. What do you like **least** about talking about your research with museum visitors and staff and volunteers? Please explain.

9. What advice would you give to a fellow researcher who was interested in participating in Living Lab about communicating research to the public?

10. If you are interested in participating in more science outreach activities, what kinds of activities would appeal to you?

APPENDIX F: EDUCATOR SELF-EFFICACY SURVEYS

What is your position at your museum?
Full-time staff Part-time staff Intern Volunteer

Prior to participating in Living Lab, what was your background in **child development research**?

Never—Living Lab is the first time	Undergraduate courses or degree	Graduate coursework or degree	Research or PD for other work projects

What is your involvement with the Living Lab at your museum? (check all that apply)

- Conduct researcher greetings
- Coordinate/manage the program
- Run orientations
- Casually talk with researchers
- Write material for visitors/web/communication
- Train other staff on Living Lab materials
- Facilitate research toy activities
- Unknown as of now

How long in months/years have you been participating in the Living Lab program? (Answer zero if less than one month)

Please mark on the scale how much you agree with each of the following statements:

Audiences:

I feel confident explaining the Living Lab research to adults who visit the museum.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel confident explaining the Living Lab research to any children in the museum who ask about it.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

In the Museum:

I feel comfortable answering any questions an adult has about a child's "performance" in a study.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I can answer questions about the methods used by Living Lab researchers.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I can recommend further activities for adults and children to try at home related to the Living Lab research.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I can recommend resources, like books or websites, for visitors to learn more about Living Lab research.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel comfortable responding to questions about child development in general.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I can help parents or staff understand why Living Lab studies are interesting or relevant.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
When I'm introduced to a new research study, I can	Strongly	Disagree	Neutral	Agree	Strongly

quickly help visitors understand it.	Disagree				Agree
I know where to look for more information/resources for visitors in my museum.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Interest:

I feel excited when I get to explain Living Lab research to a lot of different people.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I would like to do more activities with visitors about Living Lab in the future.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

[The following three questions only appeared on the post survey.]

What do you like most about talking with museum visitors about Living Lab research? Please explain.

What do you like least about talking with museum visitors about Living Lab research? Please explain.

What advice would you give to a fellow educator who is interested in communicating Living Lab research to visitors?