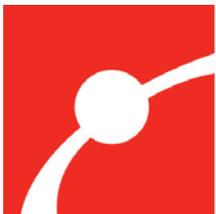


***What Happens After They Leave?
Visitors' Follow Up Behaviors to
their Museum of Science
Experiences***
Research study

Written by Elissa Chin & Christine Reich
July 2007
Report #2007-10
Funded by NIST



**National Center for
Technological Literacy®**

Museum of Science, Boston

NIST

Museum of Science, Boston
National Center for Technological Literacy

Christine Cunningham, Vice President of Research
Christine Reich, Manager of Informal Education Research and
Evaluation

Informal Education Research and Evaluation Department
Museum of Science
Science Park
Boston, MA 02114
(617) 589-0302
TTY (617) 589-0480
E-mail address researcheval@mos.org
© 2007

EXECUTIVE SUMMARY

It is relatively unknown what impact the Museum of Science has on its visitors once they leave our doors. This study aims to create a baseline understanding of how visitors follow up on what they have learned at the Museum. We examined follow up interviews from the *Star Wars: Where Science Meets the Imagination* exhibition evaluation and some of its accompanying programming, the *Rethinking Urban Transportation* forums, *Bionics and Prosthetics* forums, and *The Force and Its Many Faces* lectures. The follow up interviews were conducted via email and phone six to 10 weeks after visitors came to the Museum.

Findings demonstrate that participants' follow up behaviors tended to fall into three categories. At one end of the spectrum were some interviewed participants who did not follow up on their learning at all, but were able to remember their experiences. These participants oftentimes described not following up on their learning because they were satisfied with their Museum experience as it was and were too busy to follow up. In the middle of the spectrum were participants who did not actively continue their learning experience, but were reminded of the content while going about their everyday lives. Reminders were as basic as seeing billboards or photographs that triggered memories of the event or as informative as reading or hearing news clips that added content knowledge to visitors' understanding of the subject. Finally, there was a category of participants who actively continued to follow up on their learning by having purposeful extended discussions on the topic, joining related community organizations, reading books on the topic, or renting movies. In many cases, follow up behaviors corresponded with the Museum experience's resources, whether it was following through with the Museum's partner organization, clicking on links the webpage Museum visitors were sent, or attending future related lectures.

The findings suggest that visitors to the Museum of Science are being impacted by their Museum experiences and that their learning on the topic does not stop at the door. The findings challenge program organizers to think more deeply about building in participants' post-Museum experience learning into programs and call for more research on how resources can be designed to maximize continued learning.

TABLE OF CONTENTS

I. INTRODUCTION	1
II. METHODS	7
III. FINDINGS	9
1. Visitors who engaged in no follow up behaviors and simply remembered the experience: “I wouldn’t say I have been reminded, but I haven’t forgotten”.....	10
2. Visitors who were reminded of their experience, prompting some to be “accidental learners”.....	12
3. Visitors who actively sought to continue their museum experience.....	15
IV. DISCUSSION	19
V. CONCLUSION	21
VI. REFERENCES	23
VII. APPENDIX	
A: Additional Example Case Studies.....	25
B: Survey Questions.....	28
C: Follow up Study Codelist.....	32

I. INTRODUCTION

Museums aspire to provide experiences that are meaningful to and impacting on their visitors. The Museum of Science, Boston, which has a mission to “stimulate interest in and further understanding of science and technology and their importance for individuals and for society,” is no exception (http://www.mos.org/visitor_info/about_the_museum). Despite this aim, we know relatively little about the impact of Museum of Science visits on our patrons once they leave our doors. Follow up interviews are sometimes conducted as part of a program or exhibit’s summative evaluations, but oftentimes are very specific to each experience’s content. This study aims to create a baseline understanding of what visitors do after their visit to the Museum of Science to follow-up on the learning process. The study uses data collected from visitors following their participation in a variety of experiences (e.g., exhibit, discussion, and lecture) to identify commonalities and differences in visitors’ follow-up behaviors. This report draws on data about the ways visitors are currently continuing their learning after their Museum visit to provide insights on how we could influence these follow up behaviors through future efforts.

1. Findings from prior research about post-visit experiences, memory, and learning

This study builds upon prior research on visitors’ experiences after the Museum visit. A literature review was conducted in peer-reviewed academic journal databases along with major museum field journals on what other researchers have found about museum visitors’ experiences after they leave. Most of the research focuses on visitors’ memories after their visit. Some of the research also draws from recent efforts to use museum technology to connect the visit with visitors’ lives outside of the museum and from research examining the long term impact of conservation-based exhibits on visitors.

1.1 Visitors’ memories of their visits

Many scholars have found that deep, large-scale impact from one afternoon at the museum is rare. However, visitors’ experiences in the museum are not necessarily forgotten (Falk & Dierking, 1997; Anderson, 2003; Funch, 2006). These memories often get translated into episodic, or autobiographical experiences that are often associated with the time, look, and feel of the visit along with its content, emotions, and the social nature (Falk & Dierking, 1992; Stevenson, 1991; McManus, 1993). For example, when Falk and Dierking (1997) studied the long-term impact of field trips, 96% of the survey respondents (N=128 second graders, 8th graders and adults) were able to recall some memories of a school field trip. Survey respondents’ memories fell into the categories of: content (77%), physical setting (56%), emotions (44%), social (47%), and food (41%). Visitors to the play-exhibition, *A Journey Like No Other*, experienced a refugee simulation complete with confrontations by belligerent soldiers, interviews with authorities, and consultations with lawyers or psychologists who were really actors.

Visitors recalled the emotions of humiliation, patronization and comfort they experienced as they were interviewed about the play exhibition three to four months after their visit (Funch, 2006). Similarly, in his study of 50 people's memories of past World Expos, David Anderson (2003) found that people's memories nearly 20 years after the visit were often social in nature and reflective of his subjects' social identity at the time. For example, someone who was a young mom visiting the exposition recalled feeding her children and making sure they wouldn't get lost, a police officer working the event recalled the crowd control, and young children recalled a McDonald's. Each person had a different experience shaped by his or her age and social role at the time.

In their study of Japanese individuals' memories of a World Expo, Anderson and Shimizu (2007) found that memory is shaped by four aspects. They include: 1) Intentionality of visitors in planning to attend an event or exhibition; 2) Agenda fulfillment, or how much the agenda was met or unmet; 3) Experiential affect, or the level of emotion associated with the experience; and most importantly, 4) Rehearsal, or re-experiencing one's time at the exhibition or event. They specifically point out how rehearsal is key to building memory and in the Museum of Science's case, could be the key to serving as a building block for follow up behavior.

1.2 Measuring exhibit impact on behavior

While people carry their memories of museum field trips and expo visits from long ago, they do not always follow up on their trips or change their behavior as a result of the experience. For example, despite a deeply intense experience at *A Journey Like No Other*, the twelve interviewed visitors had not been spurred to follow up on their learning three to four months after their visit by acquiring additional knowledge about refugees. Instead, some of the visitors reported having a greater awareness and empathy for refugees when seeing or thinking about refugees. The authors postulated that this could be related to the experiential as opposed to informational nature of the exhibit.

Similarly, Adelman, Falk and James (2000) found that visitors to the National Aquarium in Baltimore experienced an increase in understanding, knowledge and awareness of an exhibition's content six to eight weeks after their visit, although no conservation action was taken as a result of the visit. Most visitors (70%, N=23) made connections between the content and to their everyday lives. Some were inspired to visit another cultural institution (24%), spoke of connections they had made between the visit and their personal lives (21%), spoke with others about their visit (18%), and saw things in the media that reminded them of their visit (18%). The categories of visitors' behaviors range from passive ways to continue their experience to deliberative actions where visitors actively sought out learning.

Dierking, Adelman, Ogden, Lehnhardt, Miller and Mellen (2004) suggest that change depends on the individual and his or her level of readiness to take action. They used stage behavior change models to identify individual levels of readiness, adapting the public health sector's Prochaska Stage Model of Behavioral Change to measure their participants' attitudes and actions before and after visiting Disney World's Conservation

Station at Animal Kingdom. The stages of the model are: 1) pre-contemplation, 2) contemplation, 3) preparation for change, 4) action, and 5) maintenance of changed behavior. Dierking *et al.* (2004) found that while short and long-term impact of Conservation Station was small, there was a relationship between impact and stage levels. Some visitors had already entered the exhibition preparing or thinking of making changes to their behaviors. This model, although not being as sensitive as they had hoped, reflected these individual differences.

Part of the reason exhibitions have encountered difficulty in changing visitors' behaviors are the many challenges to following up on learning, moreover to changing one's behaviors and attitudes based on the experience. As Larson & Sincero (2005) comment, museums contend with a loss of momentum between the museum visit and visitors' return home. Visitors have a lack of awareness or thought to follow-up through a museum website, and the exhibit and website design typically do not encourage these changes. In describing their creation of a website called Conservation Central, Larson and Sincero (2005) suggest that to see changes in visitors' behaviors, the follow-up experience should:

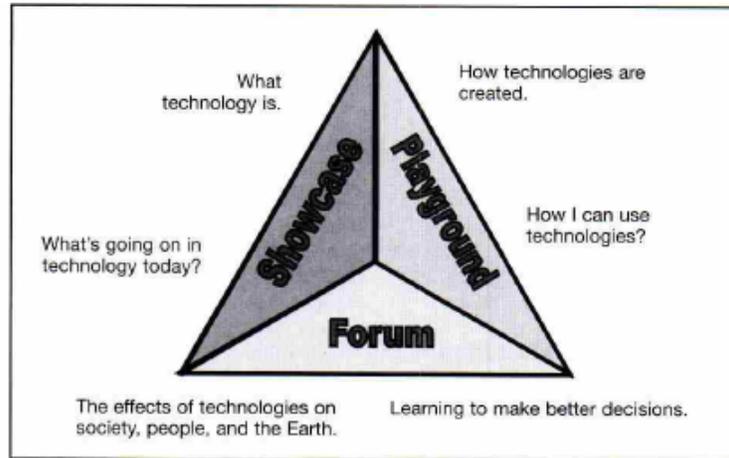
- *Include at least three hours of specific real world behaviours in design plans*
- *Create a moving experience that appeals to both the visitor's emotions and common sense*
- *Analyze prerequisite skills and tools needed*
- *Provide simple ways to make immediate changes with observable outcomes*
- *Lead in with a highly-engaging activity*
- *Provide options for PDF printouts*
- *Market the Web site activities*
- *Include provisions for measuring feedback*
(Larson & Sincero, 2005)

Recently, museums have begun promoting electronic bookmarking of exhibit information as a way to extend visitors' museum experience. Since this is a new technological feat, the depth and long-term meaningfulness to visitors is unknown. Thus far, museums have experienced various degrees of success with the bookmarking and retrieval rate (Filipini-Fantoni & Bowen, 2007). For example, through its handheld Multimedia Tour Guide, the Museum of Science's *Star Wars* exhibition had a 10% bookmark rate and 37% click through rate (Chin & Reich, 2006). The Natural History Museum in London, which has exhibit kiosks, allowed visitors to send home photographs from an exhibition and related links; it has a 14% bookmarking rate (Barry, 2005). In contrast, other Museums have received bookmarking and retrieval rates as high as 40% (Filipini-Fantoni & Bowen, 2007).

2. Setting the stage: Technology education at the Museum of Science

When it acquired the Computer Museum, the Museum of Science, Boston began to fundamentally re-examine its model of informal technology education. It realized its focus needed to extend beyond teaching "pure" science to be more inclusive of

technology. The result has been an expanded definition of the Museum of Science serving as: a *showcase* of cutting edge technologies, a *playground* to learn through hands-on activity, and a *forum* for discussion of the connection between technology, science, society and the environment and the role of one's own and others' values (Bell & Rabkin, 2002; Bell, 2006).



(Bell & Rabkin, 2002, p.27)

The Museum's first major effort applying its model of technology education across its experiences was the *Star Wars: Where Science Meets Imagination* project. This was a major temporary blockbuster exhibition developed by the Museum of Science and. The *Star Wars* project was multi-dimensional in that it encompassed both an exhibition and multiple Museum programming, and hence cut across multiple departments within the Museum and types of learning experiences. Some examples of the *Star Wars* project by different initiatives are below.

Showcase & Playground Example: *Star Wars* Exhibition

The *Star Wars: Where Science Meets Imagination* exhibition was developed by the Museum of Science and was featured at the Museum from October 27, 2005 to April 27, 2006 before traveling nationwide.

Visitors to the special exhibition had the opportunity to see how futuristic technologies featured in the films connected to real world technological developments. The exhibition featured "actual props, models, and audiovisual components covering all six *Star Wars* films [and] video interviews with the creators of the movies... highlight[ing] their motivations and the creative process that brought the stories to life" (Museum of Science, 2005). The exhibition also offered a supplementary Multimedia Tour Guide on a handheld PDA featuring Behind the Scenes content and the ability to e-mail home additional information to continue the learning experience. These cutting edge technologies were part of the *Showcase* initiative.

In the exhibition, there were also 11 hands-on interactives, highlighting engineering activities visitors could "play" and experiment with to make the best design. These experiences were part of the *Playground* initiative.

Showcase Example: Star Wars Lecture Series

One of the programs accompanying the *Star Wars: Where Science Meets Imagination* exhibition was *The Force and Its Many Faces*, a series of *Brainy Acts Lectures* taking visitors behind the scenes of *Star Wars*. Professionals who had worked on the films, such as a sculptor, directors, model makers, and production designers from Lucasfilm and Industrial Light Management, discussed the technologies and creative process the speakers had gone through. An aim of the program was to empower participants in their everyday lives by deepen participants' understanding of the technological devices they use and how new technologies affect them. This program thus represented the *Showcase* initiative. The four lectures were held on the first Friday evening of the month and were titled: "Puppets to Pixels: The Digital Transformation of Yoda," "The Worlds of *Star Wars*: Industrial Design Meets Filmmaking," "Designing Intergalactic characters," and "The Changes in Visual F/X." Typically, the speakers presented for 60-75 minutes, answered questions for 15-30 minutes and mingled with the audience during a 30-60 minute dessert reception.

Forum & Showcase Example: Urban Transportation & Bionics Forums

Forum is a program that presents science/technology content and its relationship to society. Through the small discussion group component, which is a main feature of the program, it promotes understanding the topic from multiple perspectives. The first forum series included in this study, *Rethinking Urban Transportation: The Future*, discussed future technologies in transportation systems. It featured introductory comments and icebreakers (30 minutes), two presentations from local experts on various transportation technologies and international transportation applications, with a question and answer period (60 minutes), break (15 minutes), small group discussion on recommendations each table of attendees would make to the mayor of Boston (45 minutes), and a large group report out (15 minutes).

In contrast, the *Bionics and Prosthetics: Darth Vader and the Human/Machine Boundary* forum series addressed tradeoffs of advances in artificial body parts. It consisted of a video from the *Star Wars* exhibition on cutting edge prosthetic technologies (10 minutes), an overview of the topic (20 minutes), small group discussion on what types of features participants would value in a prosthetic given that there are often tradeoffs (30 minutes), and having the large group reflect back with the lead *Star Wars* exhibition planner (20 minutes).

Each forum series had four identical events.

3. Current study: The main research questions

The purpose of this study is to establish a baseline understanding of the impact on visitors' behaviors (in these three areas) at least six weeks after visiting a Museum of Science exhibition or program. It explores whether visitors continue their learning after leaving the museum and if so, what types of behaviors they engage in. It further asks what factors and programmatic and non-programmatic supports lead to follow up learning.

This study examines a set of follow-up interviews collected from three separate evaluations at the Museum of Science to see what patterns of follow-up behaviors emerge. The three visitor experiences, highlighted in the section above, each vary in its design and level of visitor involvement (see Table 1). The programs are all directly or indirectly related to the blockbuster exhibition, *Star Wars: Where Science Meets Imagination*, that was designed to attract great visitation. The programs and exhibit feature the usage of technology in different contexts – futuristic, filmmaking, transportation, and prosthetic technologies.

This study does not examine the impact of the programs. Instead, based on the individual experience evaluations, this study presumes that the experiences have had a meaningful impact on visitors.

TABLE 1 Each Experience by Characteristics

Museum Initiative	<i>Bionics Forum</i>	<i>Urban Transportation Forum</i>	<i>Star Wars Exhibition</i>	<i>Star Wars Lectures</i>
<i>Showcase Initiative</i>	X	X	X	X
<i>Forum Initiative</i>	X	X		
<i>Playground Initiative</i>			X	
Experience Characteristics				
<i>Traditional exhibition experience</i>			X	
<i>Multimedia component</i>	X	X	X	X
<i>Listening to live expert speakers</i>		X		X
<i>Question & answer period</i>	X	X		X
<i>Small discussion group</i>	X	X		

II. METHODS

Data collection instruments

At the conclusion of the three Museum experiences, visitors were asked to fill out a paper-based survey or to participate in an interview as part of individual evaluations for the programs. During the survey or interviews, participants were asked their permission to be contacted for an additional follow up survey. Adult visitors who consented were contacted six to ten weeks later to see if they would be willing to schedule an interview. The interviews were conducted via phone and e-mail from December 2005 to June 2006 depending on the program or exhibition date.

While the exact wording varied, we asked some common questions in each follow up interview. They include the following:

- Describe to me what you remember most from your visit to _____.
- Has anything you've seen or done since your visit reminded you of _____?
- What specific concepts did you learn from _____?
- Did you continue learning about any concepts or things you saw in _____ afterwards?

Some of the instruments called out for specific memories or behaviors (e.g., recall of specific exhibit videos; whether they were inspired to do filmmaking). Appendix B has the full instruments with exact wording.

Background on study participants

A total of 83 follow up interviews were conducted as part of the individual program evaluations. By program, the participants include:

- 25 visitors to the *Star Wars: Where Science Meets the Imagination* exhibition. The participants were evenly split up among three groups: special exhibition visitors, special exhibition visitors who rented the Multimedia Tour, and special exhibition visitors who had rented the Multimedia Tour, bookmarked information to be sent to their e-mail and also picked it up (Chin & Reich, 2006). Interviews were conducted six to ten weeks post-visit via phone.
- 52 attendees to the four *The Force and Its Many Faces* lectures. This includes five individuals who went to multiple events and were re-interviewed; these individuals' post-experience behaviors were combined and coded only once. The follow up visitors attendees represent 13% of all lecture series attendees (Kunz & Reich, 2006). Interviews were conducted six to eight weeks post-visit via e-mail or phone.

- 29 *Forum* attendees, representing over slightly more than 10% of program attendees for the *Urban Transportation* forum attendees and *Bionics and Prosthetics* forum attendees (Chin & Reich, 2007). Interviews were conducted six to eight weeks post-Forum via email or phone.

Analysis

This study used a qualitative approach to create a description of what happens after visitors leave the Museum of Science. As such, we sifted through the interviews countless times over the course of several months to identify trends. Using inductive research methods, we came up with preliminary coding schemes to identify patterns and themes of processes or follow-up behaviors visitors experienced. During the course of our analysis, we considered many characteristics, such as vividness, types of memories, and degree of behaviors, and created matrices, models, and levels of follow up behavior. After several iterations of analyzing the data, we arrived at a framework of the follow-up process. To give readers a feel for the diversity of responses and to best create a description of the themes that arose, examples of visitor stories are interspersed throughout the report for readers to understand the different experiences in participants' own words.

Limitations

In aiming to create a description of the follow-up behaviors, this study draws from pre-existing summative evaluation data which has some variations in instrument design. It is also important to recognize that participants all self-selected to participate in the study, and all had initial levels of interest in the topic in attending the special exhibition or related program. Finally, all topics were related in some fashion to *Star Wars*, for which there is an extremely strong fan base. While they provide us with insight on how motivated visitors behave following their museum experience, their responses reflect what we might assume to be the best-case scenarios given the design of the three experiences.

III. FINDINGS

The visitors' post-Museum experiences varied greatly and, in some cases, demonstrated great inspiration drawn from the events, resulting in extensive follow up learning behaviors for some individuals and virtually no follow up behavior.

In total, we found three levels of follow up behaviors to characterize visitor behaviors and to base our study's framework on. The three levels, in order from lowest to highest levels of follow up behavior, are: *No Follow up Behavior*, where visitors were simply able to remember the event, *Accidental Follow up Behavior*, where visitors were confronted with objects, people, or conversations that reminded them of the event and which sometimes continued their learning experience on the topic, and *Active Follow up Behavior*, where visitors purposefully sought out ways to continue their interest in the topic. Typically, the three levels of follow up behavior were consecutive – individuals who had actively pursued learning about the topic had also been reminded of it through their everyday lives and were also able to recall elements of their Museum experience.

In defining the scope of this study, we did not limit follow up behaviors solely to continue science learning. Instead, we counted follow up behavior if visitors had extended the experience in any way relating to the content of the museum experience. This approach recognizes that visitors do not always come to museums to further their understanding of science and technology, but could be coming as part of a lifelong learning and entertainment process about the general topic (e.g., *Star Wars*) or with other agenda items in mind (e.g., supporting a child or friend's interest or being curious). As such, we did not include follow up behaviors if they were unrelated to the featured experience's content, like writing a letter of complaint to the director because the Museum's elevator was broken, even though this participant acted on his general MOS experience.

The findings largely assume, based on the independent evaluations of each program and exhibit, that the Museum of Science experience was educational and enjoyed by most participants who were interviewed.

1. Visitors who engaged in no follow up behaviors and simply remembered the experience: “I wouldn’t say I have been reminded, but I haven’t forgotten”

In a different world without kids, sure I might have [followed up]...but just surviving working and having kids is plenty – Star Wars exhibition visitor, Laura, #9

This program was interesting, but until filling out this survey, I really have not thought about it. – Star Wars Lecture attendee, Tom

About a fifth of visitors we interviewed did not follow up on their learning experience. Yet when prompted in the interview, participants demonstrated they had not forgotten their experiences. Participants were all able to recollect parts of their Museum experience, and for many participants, their memories were rich in detail and included both positive and negative aspects of their visit. In the words of one participant, their experience could be characterized as, “I wouldn’t say I’ve been reminded [of the experience] but I haven’t forgotten” (Ben, *Star Wars*, #75).

One example would be Douglas, who was able to give a detailed description of his *Star Wars* exhibition experience and could recount what he remembered most:

Well I think some of the original gear in the movies, that was memorable. Frankly, I’ve seen a lot of the stuff before because I live around the corner from Lucasfilm, so half of my friends worked on the original. My kids are fanatics [and had] never seen [the artifacts] before...I saw the robotics exhibit, I saw the original landspeeder, the Millennium, a lot of lightsabers, the Wookiee costumes, all the original gear. Had seen some of stuff here at [a] county fair and little electronic gizmo you could walk around with [that you] could do even more with. (#44)

Having two children who are huge *Star Wars* fans and living in *Star Wars* county (such that he would bump into George Lucas at the local Thai restaurant), in many ways, Douglas’s Museum visit was a continuance of his *Star Wars* lifestyle. After visiting the exhibition, Douglas talked “to my kids [about] what they liked” and that Christmas, got them *Star Wars* items as gifts. However, there wasn’t anything specifically from the Museum exhibition that compelled him to follow up on, nor did he want to. “No, no time. I don’t know if I want to” follow up, he told us. Still, Douglas characterized himself as a lifelong learner—“I’m always learning”—but just not on anything from the *Star Wars* experience:

Like Douglas, most visitors who did not follow up on their learning described having casual conversations about the experience. Typically, their exchange was cursory such as in the course of describing to friends or colleagues what they did this weekend or exchanging opinions with members of their visiting group on what they thought of the exhibition. For example, another visitor to the exhibition, Drake, had not watched the

films after visiting and hence reported that he did not think about the exhibition. He only talked briefly about the exhibition afterwards: “Other than people I was with, I think I talked with my older son who’s off in college” (#30).

As was the case with Douglas, Drake, and other participants, the thought of continuing the museum experience did not occur to them; the museum program or exhibition experience was in and of itself satisfying enough. This is not to mean that individuals did not have great experiences in which they learned a lot. One visitor to the *Bionics & Prosthetics* forum, Jim, had a compelling experience. He and his wife often attend Museum lectures. They had “heard about [*Bionics*] through a mailing from the museum and thought it sounded interesting” (#15). He reported learning the following:

The thing that hit me the most were the people we were talking to. They were disabled. Their experiences were a huge eye opener to me... [I was] amazed at how well [the prosthetics users] got around. One woman, her prosthetic, it hurt her -- which was frustrating to her... [I learned] there have been advances [in prosthetics] but not across the board.

Through attending, Jim gained an understanding that “people with prosthetics can live almost a normal life.” Yet, he did not find “any opportunity that [he could] think of” to follow up on his learning. “The exercise was educational and fruitful” in and of itself and he was pleased with the program.

In another example, Randa attended the *Changes in Visual F/X Star Wars* lecture specifically so she could hear Anthony Daniels speak. She found Anthony to be “a great moderator and storyteller,” and “was impressed by the range of effects that was discussed.” She reported learning about the “limitations of CG [computer graphic] animation effects versus more hands-on effects.” But, she was not reminded in any way of the content. She had not thought about special effects as she watched films prior to attending the *Lecture* and she reported, “I still don't really think about it very much.”

2. Visitors who were reminded of their experience, prompting some to be “accidental learners”

In her interview, Kara, a *Star Wars* fan who loves science, recalled her experience at the *Industrial Design Lecture*:

The graphics he showed to us. How they made Mustafar and used kitty litter and all the models of the ships... I learned how much they do still build—[it's] nice to see there is still old-fashioned model making. Computers are great but the model making shows a creativity. It's nice to see that there's still an old fashioned movie effects innovation.

Beyond being able to remember her experiences like Douglas, Drake, Jim and Randa, Kara was confronted with her Museum experience when going about her daily life. From attending the lecture, Kara developed an awareness of filmmaking special effects. Subsequently, when watching *Star Wars* again, she “noticed the special effects throughout it differently.”

About two thirds of the interviewed participants were like Kara in that they were reminded of their Museum experience while going about their everyday lives. This oftentimes happened through advertisements and news articles participants saw and heard in the media, in discussions prompted by others, and when watching films. However, they did not purposefully seek out these experiences to extend or build upon what they had learned at the Museum. Furthermore, not all reminders were educational in nature, but brought visitors back to their time in the Museum.

At one end of the spectrum are participants who were simply reminded of the experience by stimuli that did not introduce them to any new concepts. For example, many *Star Wars* exhibition and *Lectures* participants reported being exposed to marketing materials and to general *Star Wars*-related content going about their everyday lives. With a wide-reaching *Star Wars* advertising campaign, the Omni-covered R2D2 dome and a popular highway billboard prompted many participants' memories of their Museum visits: “We were traveling on the Pike and the billboard was still up [and an] ad in the Boston Globe,” (Andrew, #67, exhibit). Other individuals were reminded through their children's *Star Wars* toys and videogames and through photographs of the experience: “Just looking at the pictures that I have of them. That's about it since I took some pictures while I was there to actually see the stuff up close for me was just like – it was really amazing” (Ford #14, exhibit). Participants to *Lectures* also described being reminded through mementos such as flyers, autographs, and related paraphernalia: “Actually the ‘I made the leap’ pin. Every time I put my hand in my purse to get gum I feel the pin” (Lisa, #32).

For *Forum* participants, reminders of their experience often occurred as they went about their everyday lives in other forms. For *Urban Transportation* participants, reminders often occurred when participants were commuting. One participant, Hanna, had previously worked in a government transportation agency in the United Kingdom.

Since attending the forum, she had “been pretty busy at work” and hadn’t had time to follow up on things she learned at the *Forum*. But, Hanna was thinking about the event and the issues discussed: “I ride the public transportation every day, so yep, I think about it all the time! Lack of information about the new Charlie Card installations is pretty annoying. I still firmly believe public education is a big missing piece of the puzzle” (#23). This sentiment was echoed by other participants who traveled around Boston and other cities.

One thing now is when I’m on the T or traveling (laughs) I’m more aware of the presence or absence of informational amenities. I do a fair bit of traveling for my job around the country, so last week I was in Chicago and I was very cognizant of how they profiled information of train schedules, so I probably have a more heightened [awareness]. (Amanda, #29)

Having to take 90 minutes from Framingham to Boston, that reminded me... (Donnie, #23)

Arthur, a *Bionics* attendee, was reminded about the exhibit through conversations with his physical therapist, who had also attended the forum. He described, “Well being a disabled individual, I’m interested in” this topic (#5). After the forum, he did not actively follow up on his learning. However, he described how “my physical therapist went to the forum as well and sometimes my physical therapist talks about it. It’s not that I don’t want to talk about it but I haven’t had the chance to.”

For *Star Wars Lectures* attendees, being reminded of the Museum experience took form when noticing special effects in films they happened to be watching. For example, Jessica, is a long-time, hardcore *Star Wars* fan who writes fan fiction:

I have been a huge Star Wars fan for as long as the movies have been around. When I was a teenager, in the height of the movie mania, my dream was to work for Lucasfilm as a special effects designer. I was curious to see what someone with my "dream job" was actually doing.

Despite her great interest in the subject matter, Jessica did not actively follow up on her learning. Yet the knowledge she gained prompted her to notice differences in effects between *Star Wars* and a television show:

I might be more aware of the subtle features that make the movie realistic -- Robert talked about Lucas's "dirty universe," a departure from previous science fiction movies in that Lucas's starships and equipment are dirty, scratched and used-looking. I notice the absence of that lived-in look in shows such as Star Trek, and I picked up on the "scratch & dent" approach used in a version of Dune that I happened to catch on the Sci-Fi channel. (Intergalactic Characters)

It further provided her with an awareness of how special effects and animation were used when she was visiting Disney World. These instances imply that through reminders of her Museum experience, Jessica was brought back to what she had learned at the Museum experience and was subsequently able to apply it.

At the other end of the spectrum are participants who through reminders to the event, continued to learn facts and current events surrounding the topic. Oftentimes, this involved seeing news items.

One example would be Jeff, who attended the *Bionics* forum held at a local community college. Jeff attended the forum because he “saw fliers promoting it and front and center was Darth Vader and thought it was an extension of the exhibit. But then when I was at the forum, I realized it was a forum and discussion.” Afterwards, he talked with friends a bit about the event, but did not actively follow up on his learning. When asked if he had been reminded of the experience, he replied, “Well, yeah. I read an article about soldiers in Iraq who had prosthetic legs. And also watching *Star Wars* will always remind me of that” *Forum* (#7). Thus, Jeff “accidentally” continued to learn and think about the topic, extending his awareness of the application of prosthetics to other situations and events.

Another example is Nina, who strongly remembered the connection between the *Star Wars* exhibition’s memorabilia and their real world connections to cutting edge technology. After visiting with her husband, she was again reminded of the exhibit when seeing the highway billboard. When reading a magazine article, she was reminded again of her Museum experience and was able to strengthen the article’s content to her Museum experience.

You know, I think afterwards... in a science magazine, I did read about the new alternative fuel source cars, and they were talking about different forms of energy cell cars, and they made some reference to liquid plasma and different forms of... pulsar..., made me think about the exhibit itself.

She made the connection between the alternative fuel cars in the real world to the magnetic levitation exhibit and plasma in the lightsabers as was discussed in the exhibition. Nina further heard about alternative transportation when watching the news adding to her understanding of the topic: “*You know, I think the mag lev trains, they were talking about using [them] in Japan, [and] Amtrak [is considering them as a] potential option [to be more] cost-effective... I think that was on Fox news*” (#22).

Overall many participants were reminded of their Museum experience after their visit. The nature of the reminder – whether or not it possessed content—often influenced whether or not it contributed to a continued learning experience.

3. Visitors who actively sought to continue their museum experience

My husband loves Star Wars, [he] always has. Anything that had Star Wars, we would be there. Also our son is a graphic designer so we went to get info for him... We really find ourselves watching the background of the movie, watching the special effects in it. We went to the theater in New York [and] found ourselves looking at the background and now we know all the work that goes into it. So now we get movies for special effects. We had to get Lord of the Rings again. The detail, I wouldn't have noticed [it before]. – Sunny, Industrial Design lecture

Sunny and her husband, whose experience is described above, attended *The Worlds of Star Wars: Industrial Design Meets Filmmaking* lecture to gain more information for their son who is a graphic designer. Sunny's experience demonstrates the greater awareness of special effects and greater appreciation of the general filmmaking process she gained: "I think [my husband and I] enjoy films, but only watching them. We don't even like taking pictures, but our son and daughter make home movies, and I think we understand the work more. We can enjoy them more." Sunny and her husband also furthered their learning by purposefully renting movies to look for special effects.

Sunny was like nearly half of study participants in that she actively engaged with the Museum experience's content after their visit. These participants purposefully sought out ways to learn more about or think further about the topic after they came to the Museum. The form of follow up behavior varied from having extended discussions to searching the Internet, renting movies, and taking community action. Participants' follow up behavior was often related to resources each Museum experience provided for visitors. The resources are summarized below by experience:

- *Forums*: Attendees to both forums were provided a handout with links to websites with additional information. Additionally, *Urban Transportation* participants received a packet with news articles and recommended activities. The *Urban Transportation Forum* also referred its attendees to follow up with the forum partner organization, Livable Streets, which plans its own events and activities.
- *Star Wars Exhibition*: Visitors who rented the Multimedia Tour could bookmark additional information to be sent to their home e-mail address. The exhibition also had a general website with basic activities visitors could do at home.
- *Lectures*: Visitors had the opportunity to continue learning about special effects at the additional lectures in the series. There were four lectures in total.

Additionally, the museum's library, exhibits, and other programs could serve as a resource across the three Museum experiences.

We should remind readers that the study aims to capture the nature of follow up behaviors as reflected in the collected follow up interviews. The summative evaluations for each experience captured a larger sample of participants through multiple methods and hence, were able to quantify the frequency of certain follow up behaviors and generalize more broadly for each experience.

3.1 Description of Forum participants' follow up behaviors

Most prominently, a quarter of interviewed participants to the *Urban Transportation* forum used the program tools to continue their follow up behaviors. Participants followed up with the Livable Streets Alliance (LSA) partner by looking at their website and events. For example, Norris came to the *Urban Transportation Forum* originally being “interested in Livable Streets' work (which we didn't get to hear about) and the presentations.” By attending, he reported gaining “better working knowledge of the political and transportation situation in Boston.” Afterwards, he ended up checking out the LSA website: “I'm looking into the work that Livable Streets is doing.” Further, two interviewed participants ended up becoming active LSA members. While like Norris, they had known about LSA beforehand, they had never volunteered with them. At the forum, one of these participants, Cal, had realized that “a lot more is possible than what we currently have. It has expanded ideas to what we can bring to Boston.” Consequently, he has been:

... volunteering with Livable Streets since. One project [is] local. There's a Commonwealth Avenue reconstruction and Livable Streets has been trying to petition to the city of the design. So basically I've been helping them gather resources and take photos and help the process (#40).

Similarly, at the *Bionics* Forum, a fifth of participants continued to think about and follow up on the topics discussed. A couple of participants reported using the reference sheet to look at websites related to prosthetics. One student, Ken, reported that he had attended the forum because he wants to get into the prosthetics field. Since attending, he has “gone to a couple of the websites, Osser and Bach” that were provided on the resource sheet. His awareness has also been heightened through related topics he hears on the radio. He is now “paying attention to everything I hear on the subject on NPR [National Public Radio]” (#14).

In addition to using the resources provided, participants from the *Forums* continued to follow up on their learning in other ways. About one in ten participants searched the Internet independent of the links provided to them, discussed the topic in depth, and acquired or looked for reading on the topic. About two in ten individuals reported reconsidering the topic in their personal or professional lives, such as deciding to more actively bicycle or walk instead of driving to certain locations (“If the weather permits, I am more interested in walking than taking a car or trolley ride” Eva, #29) or to take a course in urban affairs (“I'm trying to enroll in an Urban Affairs course for next semester because I figured out the subject pretty much covers my interests and I should have majored in Urban Affairs” Emily, #10). Notably, two *Urban Transportation* participants drew from the resources and other *Forum* attendees to help create initiatives, such as increasing the number of bicycle racks on campus or encouraging more engineering companies to be easily commutable from the city.

3.2 Description of *Star Wars* exhibition visitors' follow up behaviors

Among the *Star Wars* exhibition visitors who had bookmarked and picked up information to send home, most participants described clicking on the links embedded in the webpage.¹ The one child we spoke to recalled his exhibit and bookmark experience in depth: “Yeah, on the Darth Vader helmet there was a link to a place where you could make a Japanese Samurai helmet out of origami” (Chad, #41). Similarly, two study participants described using the bookmarks as a “jumping-off point to explore *Star Wars* items on the Internet” (Bill, #35).

A small number of the interviewed individuals took advantage of other Museum offerings. One person chose to continue her learning experience through the Museum's other programs. Enid and her husband enjoyed their exhibit experience so much they picked up and exchanged their bookmarks with each other. She also flipped through Lucasfilm books at the local bookstore and then they returned to the Museum: “After the exhibit, our interest was piqued enough that we purchased tickets for the Friday night [Lecture], where you have the Lucas animation people there, and we joined the Museum. We were so pleased” (#34).

Still, about a third of interviewed *Star Wars* exhibition visitors who had used the Museum tools—of general Museum resources or bookmarking of information to be sent home—continued to follow up on their learning. About two in ten of the interviewed visitors continued to discuss the content extensively. About two in ten of the interviewed visitors also used the Internet to conduct online searches and read about content. Edgar, for example, reported remembering and learning about the magnetic levitation design challenge in the *Star Wars* exhibit. He remembered how it was “fun to play with” the components at the Museum. After his visit, he continued to do internet searches and learned about magnetic levitation as a transportation source. He reported that “a lot of the Japanese have it” and commented how he would like to see more magnetic levitation in public transportation (#38).

3.3 Description of *Star Wars* lectures participants' follow up behaviors

Among the *Star Wars Lectures* interviewees, five individuals reported attending multiple *Lecture* events.² Two participants commented on how the events' content drew upon the same ideas, which contributed to greater levels of learning. Mark, for

¹ The summative evaluation found that approximately 10% of general exhibition visitors had rented the Tour, 10% of Tour users utilized the bookmark function, and 37% of those individuals browsed through the online content (Chin & Reich, 2006).

² The summative evaluation for this report found that about a quarter of *Lectures* attendees reported attending a prior *Star Wars* lecture (Kunz & Reich, 2006).

example, reported that at the risk of being repetitive, “the more session(s) to attend to, the more angles and perspective you can gain from it. One show is not enough. More consistent exposure helps. That’s what education’s all about. Exposure and consistency” (*Intergalactic Characters*).

Outside of the program tools *Lectures* provided, a few participants reported renting a movie afterwards, reconsidering filmmaking as a career option, and discussing it. Two people reported acquiring reading materials on the subject matter. One example is *Intergalactic Characters Lecture* attendee, Jenya, who is a mother, a professional filmmaker, and a member of the Museum. Her young son is “passionately interested in *Star Wars* and filmmaking.” After attending the *Lecture*, they “actually just rented *Ghostbusters* because it was mentioned that someone who spoke at one of the lectures worked on it.” Another more extreme example would be Felipe, an artist, screenplay writer, and *Star Wars* fan who had once tried to work for Lucasfilm. At the *Intergalactic Characters Lecture*, he enjoyed learning about the process of filmmaking and how model-making is still a part of the process. After attending the event, Felipe decided to re-watch three *Star Wars* films and purchased a book on muscle development to help him in drawing comics:

He talked about how he studies animals and the animal kingdom. I in my process have incorporated that. Bought books about muscle development. How the artists look at objects to create their creatures-- The squirt bottle-- taking objects that exist to make the monsters.

No participants reported doing an internet search. In contrast to the other Museum experiences, a large number of the interviewed individuals said that their awareness of the topic increased; the way they watched movies changed. However, most individuals had not decided to follow up on their learning in any way, in either tapping into Museum resources, continuing to understand how special effects worked in movies or following up on *Star Wars* issues. In part, this may be related to the difficulty of acquiring tickets to the popular *Lectures* series (Kunz & Reich, 2006) or to the structure of the interview.

IV. DISCUSSION

Museums hope to have real impact on the public in their understanding of and appreciation for a certain topic. This study raised the question about whether visitors' Museum experience to *Forums*, *Lectures*, and the *Star Wars* exhibition was an isolated educational event or if it extended beyond the museum doors. It further examined the nature of visitors' follow up behaviors in relation to the learning prompts each experience provided. Across categories, we found every visitor remembered their experience. Over two-thirds of visitors reported being reminded of their experience and about half of visitors actively followed up on their museum experience in some fashion. The types of active follow up behaviors ranged widely, from discussing the experience and topic at length with others to searching the Internet and taking community action. The findings also demonstrate that the resources the Museum provided for visitors in these experiences were a common method visitors reported using to follow up on their experience.

The results build upon Adelman, Falk & James' study (2000) at the National Aquarium in Baltimore which found that six to eight weeks post-visit, 70% of participants had been able to provide examples of things they had seen, done or heard that reminded them of their visit, 18% had been reminded by something in the television or the media, 18% told others about their visit, and 24% reported being motivated to visit other cultural institutions. In the case of these three technology experiences at the Museum of Science, similar behaviors occurred, but in many cases, additional follow up behaviors occurred which extended visitors' experience much farther. Part of this difference in types of follow up behavior might have to do with the nature of the topic relating to everyday life and popular culture. These findings suggest that by simply connecting featured topics to objects and issues in their everyday life, such as tapping into the prevalence of the movie industry and how people spend their leisure time in American culture today or leveraging issues covered in the media, the Museum experience can be naturally prolonged and continue to enrich our visitors' understanding of the topic. This is not to say that more arcane topics like *Bionics* did not lead to meaningful, rich learning experiences for participants, but that the frequency of being reminded of the experience is influenced by its coverage by the media and centrality to society today (and to some degree, individuals' identities and local communities, such as if one works in a rehabilitation hospital or has a disability).

The findings strengthen the fact that many times our visitors are impacted by their Museum of Science experiences and further, visitors are receptive to following up on their learning both from Museum resources they are provided with and resources they locate independently. The findings raise a question about whether or not to provide visitors with resources if certain topics could naturally remind them about the experience in their everyday lives. Much depends on the level of follow up behavior a program or experience hopes to inspire in its visitors. If a Museum experience's educational goals aspire to promote simple awareness of a topic, the findings suggest that providing

resources are not necessary. However, if the Museum experience aspires to promote professional development, advancement of hobbies, action, or general lifelong learning on the topic, it would make sense to provide suggestions on how to continue learning.

With program or exhibit resources being a method visitors used to follow up on learning, it may be wise to further explore how to successfully design such resources. The experiences studied here lend insights on alternative ways the Museum can promote continued learning and involvement with the Museum. First, through partnerships, participants are able to be supported in their learning activities by an organization that has a fuller line of resources on specific topics. With the case of the *Urban Transportation Forum*, the Livable Streets Alliance partnership proved to be a powerful tool with many participants looking at their website online. Another avenue would be more closely relating Museum programs and exhibits with the Museum's website. The Museum might think about the importance of more extensively linking exhibits and events such that they are in a series and related (e.g., a Lecture, Forum and an exhibit on the same topic) and have current news on their website relating to these topics. Similarly, advertising for related programming and the website could be embedded within the exhibit to promote a continued learning experience.

V. CONCLUSION

The findings bring us back to a primary question about what role follow-up activity plays institutionally. Often programs and exhibits focus on developing the actual event – marketing of the event, logistics of the room set-up, arranging for the speakers, and deciding on the focus of the event and its various components. Thinking of what comes next does not traditionally fall under the program’s or exhibit’s responsibility and some might argue, is already provided through the Museum’s resources overall (e.g., other programs, related exhibits, and library). Some might further argue that the focus should be primarily on the experience here at the Museum and, with limited budget and time, not much else. We could argue the importance of providing resources to help visitors follow up on their learning and Museum experience returns to the Museum’s mission. Part of the Museum’s core vision is to promote lifelong learning:

The mission of the Museum of Science, Boston is to stimulate interest in and further understanding of science and technology and their importance for individuals and for society. To accomplish this educational mission, the staff, volunteers, overseers, and trustees of the Museum are dedicated to attracting the broadest possible spectrum of participants and involving them in activities, exhibits, and programs which will: encourage curiosity, questioning and exploration; inform and educate; enhance a sense of personal achievement in learning, respect individual interests, backgrounds and abilities, and promote life-long learning and informed citizen...

(Retrieved June 11, 2007 from:

http://www.mos.org/visitor_info/about_the_museum)

This study raises many questions that warrant further exploration. First, there is the question about the relationship between being accidentally reminded of the experience and continuing to learn about the topic (e.g., reading a news article that applies or extends concepts) and being compelled to then take action (e.g., picking up a related book from the library or having an at-length conversation about the topic with friends). Could the reminders prompt someone who is a novice to the topic to continue to think about and be more informed of the topic? Could the reminders prompt someone on the verge of taking action to indeed do so? Or are individuals who are already embedded in the topic and eager to take action more likely to be reminded of the Museum experience regardless of attending?

Part of the question this study raises is the identity and intentionality of the participants, which Falk, Moussori, and Coulson (1998) discuss in their study of visitors to the National Museum of Natural History’s *Geology, Gems and Minerals* exhibition. They found that visitors who entered the exhibition with high educational motivations learned more than visitors who had low educational motivation; visitors with high entertainment motivations tended to stay in the exhibition longer and could describe more about the

content afterwards. In the case of the Museum of Science experiences, some of visitors' follow up behavior was clearly related to intentions. Being an avid bicyclist looking for connections in the urban affairs community or being a hardcore *Star Wars* fan seeking to indulge a hobby, for example, led to different experiences than participants who happened into the event or experience. While this study did not fully explore the relationship between identity and follow up activity, we found that people who were not strong hobbyists also engaged in different kinds of follow up behaviors.

With a field-wide movement calling for museums to extend beyond the walls of the building, being a museum in today's times means constantly re-examining the needs and behaviors of our visitors. Providing visitors with tools to follow up on their behavior is predicated on the belief that doing so will lead to a series of actions and to build up a body of knowledge and a more educated, active citizenry. By building in more resources, there will be greater risks for program organizers to take, such as the possibility of developing resources that will be underutilized. It is with greater research and trial and error that an understanding of audience interest and needs can be developed and successfully implemented.

VI. REFERENCES

- Adelman, L.M., Falk, J.H., & James, S. (2000). Impact of National Aquarium in Baltimore on visitors' conservation attitudes, behavior, and knowledge. *Curator*, 43(1), 33-61.
- Anderson, D. (2003). Visitors' long-term memories of world expositions. *Curator*, 46(4), 401-20.
- Anderson, D., & Shimizu, H. (2007). Factors shaping vividness of memory episodes: Visitors' long-term memories of the 1970 Japan World Exposition. *Memory*, 15(2), 177 - 191.
- Barry, A. (2005). Creating a virtuous circle between a museum's on-line and physical spaces. *Museums and the Web 2006*. Retrieved online on April 2, 2007 from www.archimuse.com/mw2006/papers/barry/barry.html
- Bell, L. (2006, Nov. 19) Personal correspondence.
- Bell, L. & Rabkin, D. (2002). A new model of technology education for science centers. *The Technology Educator*, 62(3), 26-28.
- Chin, E. & Reich, C. (2006). Lessons from the Museum of Science's First Multimedia Tour. (Report No. 2006-5.) Boston, MA: Museum of Science.
- Dierking, L.D., Adelman, L.M., Ogden, J., Lehnhardt, K., Miller, L. & Mellen, J.D. (2004). Using a behavior change model to document the impact of visits to Disney's Animal Kingdom: A study investigating intended conservation action. *Curator*, 47(3), 322-43.
- Falk, J. & Dierking, L.D. (1992). School field trips: Assessing their long-term impact. *Curator*, 40, 211-218.
- Falk, J., Moussori, T.D., & Coulson, D. (1998). The effect of visitors' agendas on museum learning. *Curator*, 41(2), 107-120.
- Filippini-Fantoni, S. & Bowen, J. Bookmarking in museums: Extending the museum experience beyond the visit? In J. Trant and D. Bearman (eds). *Museums and the Web 2007: Proceedings*. Toronto: Archives & Museum Informatics, published March 31, 2007 at <http://www.archimuse.com/mw2007/papers/filippini-fantoni/filippini-fantoni.html>
- Funch, B.S. (2006). A Journey Unlike Any Other: An interactive exhibition at the National Museum in Copenhagen, Denmark. *Curator*, 49(2), 205-216.

- Kunz, E. & Reich, C. (2006). "The Force & Its Many Faces" *Star Wars* Conversation Series Summative Evaluation. Report No. 2006-9. Unpublished internal report.
- Larson, B. & Sincero, P. (2005). Using museum web sites to change visitors' real-world behaviors. *Museums and the Web 2005*. Retrieved online on April 2, 2007 from: www.archimuse.com/mw2005/papers/larson/larson.html
- McManus, P.M. (1993). Memories as indicators of the impact of museum visits. *Museum Management and Curatorship*, 12, 367-380.
- Museum of Science. (2007). Mission of the Museum of Science. Retrieved April 2, 2007 http://mos.org/visitor_info/about_the_museum
- Museum of Science. (2005, September 1). *Star Wars: Where Science Meets Imagination* Content Outline. Boston, MA: Author.
- Stevenson, J. (1991). The long-term impact of interactive exhibits. *International Journal of Science Education*, 13(5), 521-533.

VII. APPENDICES

APPENDIX A Additional Example Case Studies

Examples of participants who follow up on learning

Wendy, #8, 2nd Urban Transportation forum, phone interview

In this quick phone interview, Wendy briefly described how she is a college student minoring in urban issues and policy. She has “always been a huge bicyclist, [but] didn’t have an outlet” to express this interest with other like-minded individuals so the Forum provided a chance for her to be “able to network” and meet other students from her university as well as “a few people who were very involved in public transportation” sitting at her table. Wendy also belonged to an advocacy group, Bikes Not Bombs. This forum “triggered a desire to learn more about transportation in systems... and I started a group afterward with a group of students on campus for bicycling and [being] bicycle friendly in terms of [having] bicycle racks.” She occasionally thought about things said in one of the presentations about advocacy (“preach to the choir so it can sing”) and thought how nice it’d be if Boston closed down its streets once a week to bicyclists, like in Bogota.

Jim, #19, *Puppets to Pixels: The Digital Transformation of Yoda Star Wars* lecture, e-mail interview

Jim, a long-time *Star Wars* fan, was interviewed after attending the first lecture. After attending, he looked at clips the speakers described at the event and also showed a clip to a friend: “Oh, yes. I actually pulled out my DVD of Episode III to show the aforementioned clip of Christopher Lee to a visiting friend.” Jim remembered the film clips the speaker showed, speaking to the speaker during the dessert reception, appreciating the speaker’s humor and the techniques described: “There were quite a few things, like some of the image layering techniques involved, the head-replacement techniques for the stunt players, the cloth simulation software, etc.”

Mitchell, #20, 4th Urban Transportation forum, e-mail interview

After attending the Forum, Mitchell told a friend who writes for a “website dedicated to urban thinking” about the forum “so he would consider writing about different modes of transportation.” He had a couple of urban planning/transportation books on his “To Read” list, however had not otherwise continued learning about the activity. He had come wanting to find out about “projects I may want to learn more about or support.” He recalled other participants from the Forum being “very kind and considerate” yet recalled how he wished he was “learning more from an expert perspective” since the conversation was informal, “artificial and ineffectual.” Mitchell had no background in urban transportation, but he professed to “love living in urban environments and I feel that automobile traffic is an extremely inefficient method of transporting people.”

Nellie, #8, 4th *Bionics and Prosthetics: Darth Vader and the Human/Machine Boundary* forum, e-mail interview

Nellie is a doctoral student “working on designing a simple and cost effective hand prosthesis.” She remembered learning “the fact that all commercial prostheses use synchronous motors, which decreases power efficiency of that prosthesis” and after the forum, followed up on that fact through an Internet search. She later saw a “news article on CNN that talked about neuroprosthesis” that reminded her of the Forum. Nellie recalled learning other people’s perspectives and more specifically that “except for amputees, all other people prefer a prosthesis that is more functional than it [sic] is cosmetic.”

Samuel, #50, *Star Wars: Where Science Meets Imagination* exhibition & Multimedia Tour User who didn’t bookmark, phone interview

This visitor reported gaining a greater awareness of the topics. While Samuel didn’t purposefully follow up on concepts he learned in the exhibition, he explained that “What happens with me often times...like in this case... [is] I have the movies...so I specifically go back and look at the extras [i.e. the extra features on the DVDs] now. The exhibit got me thinking about that...how they made things.” Samuel could not specifically recall what he had learned. However, he mentioned how he found the robots and car content areas of the exhibition fascinating and said “I was reading in *Popular Mechanics* – after seeing the exhibit, I wondered if I should get a subscription to that magazine, especially about robotics and cars with robots.” He was one of the few people who mentioned the connection between the real world and the Star Wars technologies: “I think the biggest thing that I remember was . . . how close we are in actual (real world) technologies from Star Wars technology.”

Participants who were reminded of the museum experience

Stanley, #50, *Star Wars: Where Science Meets Imagination* exhibition, phone interview

Stanley was a visitor to the *Star Wars* exhibition who remembered learning “how close we are in actual (real world) technologies from Star Wars technology.” Stanley described not following up on anything he saw at the exhibition “probably because my life at home is extremely active” but found the magazine, *Popular Mechanics*, bringing him back to the exhibition and wondering whether he should get a subscription. He also thought of the

Not on purpose. What happens with me often times...like in this case...I have the movies...so I specifically go back and look at the extras [i.e. the extra features on the DVDs] now. The exhibit got me thinking about that...how they made things [i.e. in the movies]

Participants who demonstrated no purposeful follow-up activity

Linda, #9, *Star Wars: Where Science Meets Imagination* exhibition, phone interview

Linda is the mother of a 3 and 5 year old. She recalled her experience in terms of her children’s experiences: “The 5 year old absolutely loved the movies. So what I

remember most is her joy of seeing what went into the movie itself, the costumes the props.” While she was reminded of the exhibit by seeing advertisements for the exhibition, and she had photos taken with characters like Darth Vader, she didn’t do anything beyond this. “In the perfect world without kids, sure I might have... but just surviving working and having kids is plenty.”

Stanley, #4, *Puppets to Pixels: The Digital Transformation of Yoda Star Wars* lecture, phone interview

At the time of the interview, Stanley was trying to decide whether he wanted to pursue animation as a career. Stanley remembered the speaker’s “struggles with how to incorporate Yoda into sequences” and the multimedia presentation. However, he did not follow up on anything that he learned nor did the event inspire him in any sense – perhaps because this interest was so deeply ingrained in his life.

APPENDIX B FOLLOW UP INTERVIEW QUESTIONS

Forum Participants Interview

1. What do you remember most about the *Rethinking Urban Transportation* forum?
2. Recall that there was a portion of the event when you discussed possible transportation options you as a group would recommend to the mayor. What do you remember about your experience during the small group discussion?
 - 2a. What role did the discussion play in your experience at Forum?
 - 2b. What, if anything, do you feel you gained from this discussion?
 - 2c. How did your group reach their three priorities?
 - 2d. How did the group's discussion affect your own three personal priorities?
 - 2e. Was there any disagreement/conflict between the members of the group? If so, how were they resolved?
3. Since the Forum, have you followed up and/or continued to learn about any of the issues that were discussed during the event? Explain.
4. Have you seen or done anything since the program that reminded you of the urban transportation event? Explain.
5. Since the program, how, if at all, has the way you view urban transportation changed? Explain.

Now, if I can bring you back for a moment to the actual day of the event, I'd like to ask you a few questions about that day.

6. What prompted you to come to the *Rethinking Urban Transportation* forum?
 - 7a. Before coming to the Forum, what did you expect the Forum to be like? (What were you hoping to gain from the Forum?)
 - 7b. Were your expectations met or not met? Explain.
8. Overall, would you say that your impression was that the program offered a fair and objective forum for discussing transportation issues, or would you say that the program was highlighting some sort of agenda? (Tell me a bit more about why you feel that way.)
9. Would you be interested in returning to another Forum? (Why or why not? What kinds of topics would you be interested in?)
10. Is there anything else you'd like to add?

Star Wars Exhibition Phone Interview

A. Interview for general exhibition visitors who did not rent the Multimedia Tour

1. Memory

- Describe to me what you remember most from your visit to the *Star Wars* exhibit? (What about xxx did you remember?)
- Has anything you've seen or done since your visit reminded you of the exhibit?
- Did you watch the videos in the exhibit that anyone, with or without the MMT, could see? Did you watch not many or a lot?

Now I have some questions about what you learned from the exhibit.

2. Learning

- What specific (things) concepts did you learn from the exhibit? (Probe for details)
- Prompted:* I'm interested in if you can tell me what you remember learning about at the Darth Vader exhibit, if anything. (What do you recall thinking?) How about the lightsabers exhibit?

Now I'd like to ask you some questions about after your visit to the *Star Wars* exhibit.

3. Extended Visit/Learning

- Did you continue learning about any concepts or things you saw in the *Star Wars* exhibit, MMT, or online bookmarks afterwards? What? How? After which? (Prompt: Did visiting the exhibit/using the MMT/or bookmarking prompt you to:
 - Talk about or write to someone SW related topics with others? [Indicate which topics – are they science and technology related]
 - Search for more information about SW-related topics on the web or through the web? (Were they science and technology related?)
 - Notice related SW-related topics in newspaper, radio, TV>
 - Do some other activity? Please explain: ()

4. Other:

- Do you have a background in science or engineering?
- Do you have any thing to add?

B. Interview for general exhibition visitors who rented the Multimedia Tour

1. Memory

- Describe to me what you remember most from your visit to the *Star Wars* exhibit? (What about xxx did you remember?)
- Has anything you've seen or done since your visit reminded you of the exhibit?
- From your interview at the end of the exhibit, I see that you rented the handheld MMT. What do you remember most about the handheld MMT? (Describe to me what you remember about xxx.)

- ❑ In retrospect, how do you think your experience of the *Star Wars* exhibit was different than if you hadn't used a MMT at all?
- ❑ Did you watch the videos in the exhibit that anyone, with or without the MMT, could see? If not, why?

Now I have some questions about what you learned from the exhibit.

2. Learning

- ❑ What specific (things) concepts did you learn from the exhibit? (Probe for details)
- ❑ What specific (things) concepts did you learn from the MMT? (Probe for details)
- ❑ *Prompted:* I'm interested in if you can tell me what you remember learning about at the Darth Vader exhibit, if anything. (What do you recall thinking?) How about the lightsabers exhibit?
- ❑ Did you find the content on the MMT significantly different than what was in the exhibit? (Can you comment on that?)

Now I'd like to ask you some questions about after your visit to the *Star Wars* exhibit.

3. Extended Visit/Learning

- ❑ Bookmarks:
 - I see that you did bookmark information to be sent home.*
 - Did you pick up your bookmarks after your visit?
 - How did you use your bookmarks?
 - Did you forward them to anyone?
 - Did you check out any of the other links?
 - What did you like most about the bookmarks?
 - What did you like least about them?
 - How did the bookmarks shape your understanding of the exhibit?
- ❑ Did you continue learning about any concepts or things you saw in the *Star Wars* exhibit, MMT, or online bookmarks afterwards? What? How? After which? (Prompt: Did visiting the exhibit/using the MMT/or bookmarking prompt you to . . .
 - Talk about or write to someone SW related topics with others?
[Indicate which topics – are they science and technology related]
 - Search for more information about SW-related topics on the web or through the web? (Were they science and technology related?)
 - Notice related SW-related topics in newspaper, radio, TV?
 - Do some other activity? Please explain.

4. Other

- Do you have a background in science or engineering?

5. We're primarily interested in learning more about the handheld.

- Do you have anything else you'd like to add?
- ❑ Or can you comment in retrospect on how the handheld shaped your understanding of the exhibit, if at all?

Star Wars Lecture Series

1. What prompted you to come to “Changes in Visual F/X?”
2. What do you remember most about the program “Changes in Visual F/X?” (If they can’t remember anything, jog their memories.)
3. How did you feel the format of “Changes in Visual F/X” was similar and how was it different from other adult programs that you have attended either here or at other museums?
Were there parts of the format that you especially liked or did not like?
4. Has anything you’ve seen or done since the program reminded you of “Changes in Visual F/X?”
5. Since the program, how, if at all, has the way that you watch movies changed?

Do you notice the use of technology in the movies/television you have watched?

6. How, if at all, has the program inspired you to want to become a home/amateur filmmaker?
(If the person ranked themselves 4-6 on the survey, ask) Have you tried any new filmmaking techniques because of the program?
7. What, if anything, did you learn from the program “Changes in Visual F/X?”
8. *(For future follow-up surveys)* How, if at all, has your experience at this program been influenced by previous programs from “The Force & Its Many Faces” series?
9. Did you visit the exhibition “*Star Wars: Where Science Meets Imagination*” at the Museum of Science, Boston?
 - Yes
 - No
10. *(If yes)* Did you attend the exhibition before or after attending “Changes in Visual F/X?”
 - Before
 - After
11. *(If no)* Why didn’t you visit the *Star Wars* exhibition?
12. *(If visited before)* How, if at all, did the exhibition motivate you to want to come to “Changes in Visual F/X?”
13. *(If visited after)* How, if at all, did “Changes in Visual F/X” motivate you to want to visit the *Star Wars* exhibition?
14. Is there anything else you’d like to add

APPENDIX C FOLLOW UP STUDY CODELIST

	Yes	NA	Follow up behaviors
<input type="checkbox"/>	1: Only remembered event, no follow-up behavior		
	<input type="checkbox"/>	<input type="checkbox"/>	Remembered event
	<input type="checkbox"/>	<input type="checkbox"/>	Talked about it casually
<input type="checkbox"/>	2: Was reminded of the content; passive, “accidental” continuing of learning		
	<input type="checkbox"/>	<input type="checkbox"/>	Increased or reinforced awareness of topic
	<input type="checkbox"/>	<input type="checkbox"/>	Increased or reinforced awareness through MEDIA
	<input type="checkbox"/>	<input type="checkbox"/>	Increased or reinforced awareness through MOVIES
	<input type="checkbox"/>	<input type="checkbox"/>	Increased or reinforced awareness through COMMUTING
	<input type="checkbox"/>	<input type="checkbox"/>	Increased or reinforced awareness PROFESSIONALLY
<input type="checkbox"/>	3: Actively continued learning		
	<input type="checkbox"/>	<input type="checkbox"/>	Discussed the topic at length / in depth
	<input type="checkbox"/>	<input type="checkbox"/>	Rented movie or purposefully showed movie
	<input type="checkbox"/>	<input type="checkbox"/>	Acquired reading materials
	<input type="checkbox"/>	<input type="checkbox"/>	Internet search
	<input type="checkbox"/>	<input type="checkbox"/>	Took action with program tool
	<input type="checkbox"/>	<input type="checkbox"/>	Reconsidered topic in career, personal life context
	<input type="checkbox"/>	<input type="checkbox"/>	Other:
YES	NA	Personal identity mentioned	
<input type="checkbox"/>	<input type="checkbox"/>	No affinity with content	
<input type="checkbox"/>	<input type="checkbox"/>	Supporting parent or friend	
<input type="checkbox"/>	<input type="checkbox"/>	Professional or student in topic/area	
<input type="checkbox"/>	<input type="checkbox"/>	Prior interest (hobbyist or SW fan)	
<input type="checkbox"/>	<input type="checkbox"/>	Member of affinity group	
<input type="checkbox"/>	<input type="checkbox"/>	Museum affiliate	
<input type="checkbox"/>	<input type="checkbox"/>	Identity other	

Additional Notes: