An Assessment of the 2013 Early Youth Engagement through Science Program at the National Museum of Natural History

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Smithsonian Institution

Office of Policy and Analysis
Washington, DC 20013
Preface

In August of 2013, the Office of Policy and Analysis (OP&A) conducted a study of the Early Youth Engagement with Science (EYES) program at the request of the Office of Education & Outreach at the National Museum of Natural History (NMNH).

The EYES observation and interview study focused on the experiences of the participants in the program. It is hoped that this report will shed some light on how the participants responded to the elements of the EYES program, as well as how to improve the program both to better match its stated goals and to make it a more enjoyable experience for the participants.

We would like to thank the staff of the EYES program, especially Nicole Webster and Elio Cruz, for making our Research Fellow, Paul B. Sturtevant, feel welcome and working with him to facilitate the observations and interviews with the participants of the program. Paul conducted all the observations and wrote this report.

Whitney Watriss, Acting Director
Office of Policy and Analysis
Abstract

The results of this assessment of the Early Youth Engagement through Science (EYES) program show that EYES is effective. When asked, all of the participants indicated that they had enjoyed their week, some going so far as to wish the program were longer:

“It was really fun! I have met the greatest people... it’s so awesome that we’ve become such good friends with all the people in the camp in just five days.” “This week was so great! I’m sad it’s over.” “It was, like, the coolest camp I’ve been to in the past... twelve years of my life.” “I want this to be like, longer—you should make this two weeks. I feel like we just started.” “We should go later in the afternoon, like until five.” “Can we apply for this again next year?”

These are all good signs. There are a few issues with recruitment; in order for the program to fulfill its stated mission of serving underrepresented groups, program staff need to give more careful consideration to the level of economic and social privilege of their applicants. Moreover, the camp largely seems to be aping a “school” format, where participants are “taught” and expected to “learn” through lectures and activities that would not be out of place in a middle-class school.

“I wish there was more fun stuff, especially in the mornings. Mornings always started off slow....” “I wish there was some time we could just, like, play—you know?” “This afternoon we had too much just sitting to listen to people talk... I wanted to have a break.” “That was just like what we did when I visited here with my school.”

Some of the activities were unique experiences that elicited genuine enthusiasm:

“I loved looking at all the bones, that was so cool!” “I loved seeing how those people died by looking at the skeletons.” “The meteorites were my favorite... touching the moon rock and the dinosaur rock.” “I loved the otters...going back to see them so close....”

The most praised activities were memorable because they included a combination of three elements: a compelling speaker (usually a scientist with the SI): “I liked the forensic anthropology lady— she was really cool,” a hands-on activity – “putting the skeletons back together was awesome,” and extraordinary artifacts with which to interact – “I got to hold a piece of Mars!”

In order to make the program better for its participants, thought should be given to how the activities might be made more “fun” – ideally by incorporating “game” elements, as well as more exploratory play and creative aspects. Some of the activities deserve to be tweaked, either because some aspects of them were disliked:

“I wanted to go more behind-the-scenes, that was what they said we would be doing.” “Looking at the bees was boring, and too hot... using iPads made it impossible.” “I thought we would get to control the telescopes more.” “During the ocean talk... I fell asleep... it was too long.” “The YES people were too quiet... and boring.” “My computer didn't work.”
Or simply because they were so forgettable that they were gone even by the end of the day. Others perhaps should be entirely re-thought – ideally to give a more cohesive structure to the camp’s activities as well as leading to a final product that they can share with their peers and parents.

To sum up, the EYES program should be continued. NMNH staff has their work cut out for them in terms of making this a program ideally suited for its target audience and also fulfilling all of their stated objectives. In the full report that follows, OP&A has focused primarily upon those areas in need of improvement, as these suggestions are likely to be more useful than a recapitulation of the program’s virtues. That said, it deserves to be repeated that, while in need of some adjustments, the EYES program is a good one that largely left participants very satisfied with their experience and eager for more.
Introduction

A Brief Overview of the EYES program

In August 2013, the Office of Education & Outreach at the NMNH inaugurated a new summer program for middle school-aged children. Each of the program’s two sessions lasted a week, with twenty participants in each. As described on the program website: “EYES is a new 5-day program for middle-school students in grades 6-8 that introduces students to Smithsonian science through behind-the-scene tours, field trips, conversations with scientists, and fun activities.”¹ This program was housed in the Q?rius space, the new education center in the NMNH (due to open to the public in November 2013), and included a day trip to the Smithsonian National Zoological Park, as well as a number of activities with scientists and curators in the NMNH and under the broader Smithsonian Institution umbrella.

This program was designed to be complementary with the already-existing Youth Engagement with Science (YES) program for high school-aged children. These two programs share similar goals: to help engender interest in science and foster career aspirations in science among young people, with particular focus on those groups underrepresented in the sciences (in particular, Latinos, African Americans, and women).² Furthermore, it was hoped that the EYES program would serve as a feeder program for YES.

Evaluative Goals

The Office of Policy and Analysis was asked to evaluate the relative successes of the EYES program in its pilot year along a number of metrics. The organizers wanted:

1) to determine whether the participants enjoyed the activities in the program and to understand what did and did not appeal to them;
2) to see whether the EYES program had inspired these participants to consider pursuing careers in the science; and
3) to determine whether the EYES program was successful in inspiring the participants to enroll in further SI programs.

¹ http://www.mnh.si.edu/education/yes/eyes.html
Methodology

This study was conducted using a combination of ethnographic observations and a series of interviews with the program participants. First, an OP&A observer was present during the entire program for both weeks (60 hours in total), and observed all activities as well as the participants’ reactions to activities and interactions with organizers and each other. Second, each participant was interviewed daily in a small group of four or five. There were six rounds of interviews: the first was an introductory interview at the beginning of the program, and the second a round of interviews at the conclusion of each of the five days. Occasionally, due to time overrunning, the interviews had to be conducted at the beginning of the following day. These group interviews lasted between one minute and thirty seconds to fifteen minutes, with the majority being between three and a half and six minutes long. All interviews were audio recorded.

In the introductory interview, the participants were asked to talk a bit about themselves, and asked questions about their background with science (such as what their favorite subject in school is, what they want to be when they grow up, and whether they have any family members who work in the sciences), as well as their expectations for the week. The first four end-of-day interviews (Monday through Thursday) focused largely upon their opinions about the day’s activities – what they did and did not enjoy, and, if they were running the program next year, what changes they would make to improve the experience. The final interview was a plenary discussion. In this, the participants were asked their opinions of the program as a whole, as well as revisiting the question of what they want to do when they grow up. They were also asked whether they could see themselves doing the jobs of the scientists they met over the week, whether they plan to apply for further SI programs, and how they might be aided in spreading their interest in science among their friends.

It should be noted that this assessment, while concerned with participants’ intended actions in the future (such as participating in more SI programs or fostering career interests in the sciences), it cannot comment as to the efficacy of the program in achieving these goals in the long term, as there was no provision for follow-up studies to determine what becomes of these participants once they leave the program.

General Commentary

The Participants

There were twenty participants in each session. One of the stated goals of the EYES program is to foster an interest in science among underrepresented groups—most notably, African Americans, Latinos, and women. Examining the degree to which this program is successful is more complex than it might first seem. The first question is whether these underrepresented groups were well-
represented in the program. In that regard, the answer is qualified “yes.” In the first cohort, seven of the twenty were African-American and eight were Latino (with two multiracial Latinos). In the second cohort, there was less representation of African Americans and Latinos: only one Latino (with another multiracial Latino), and seven African-Americans. In future, if this is intended to be a program targeted at these groups, there must be a redoubled effort to continue recruiting amongst these groups.

Representation by women, on the other hand, was more successful. The first session had a more-or-less even split with 11 boys and 9 girls, and the second had a clear majority of girls, with fourteen girls and six boys. Continued targeted recruitment of girls is warranted if NMNH wishes to continue getting a female-majority cohort.

A more complex issue with the recruitment process has nothing to do with race/ethnicity or gender, but instead about socio-economic circumstances. Most, if not all, of the children were from households that were well off, with no lack of zip codes for well-to-do areas and expensive private schools represented. This is hardly surprising since these children are the ones most likely to already be familiar with the SI and have connections – in at least three cases through family who are SI employees – to the museum. Based on observation, none of the children seemed to be from deprived households, with many owning (and bragging about owning) the latest smartphones.

This raises a critical issue about the purpose of the program, and ties into larger questions about promoting scientific careers among minority groups. Is this program’s objective of recruiting underrepresented groups truly aspirational – in that it is intended to promote social mobility and scientific engagement as a vehicle out of the cycle of poverty, or is the objective simply to entice already-affluent ethnic minorities and women to take up scientific careers?

If the answer is the former, it presents a number of issues. First, the recruitment process needs to have some component of means-testing. This can (and should) be subtle, such as a box on the application form inquiring about the child’s parent(s)’ occupation (though not income level). Another way to assess this subtly (though imperfectly) would be to hold interviews for the program in a fashion similar to the application process for YES. This will take more time – especially as the pool of applicants grows – but could help NMNH better determine the individual child’s circumstances as well as possibly detecting any behavioral issues that may be problematic (discussed below). Furthermore, it could help weed out students like four in the two cohorts here who reported that their parents filled out the application for them and that they had no particular interest in (or in one case, foreknowledge of) the program prior to arrival.

Another option is to recruit through schools (public, charter) that serve primarily minority neighborhoods or through after-school programs, like Boys and Girls Clubs, CentroNia, and the Latino American Youth Center. NMNH is already doing some recruitment in this way, and these efforts should be continued.
This will complicate the recruitment process in that it will require careful consideration of the rubric under which a child is either accepted to or rejected from the program. NMNH will have to weigh the importance of a child’s pre-existing abilities and interest in science against the goal introducing children to science who may not have had these opportunities in school. These recruitment criteria may be (though hopefully are not always) mutually exclusive: a child from an under-privileged household is less likely to have had exposure to science, which means that their interest and ability may naturally be less than those from more affluent backgrounds.

It is a difficult balance to strike, and hopefully with a wider pool of applicants (since this year there were 60 for 40 places) this issue will resolve itself with a range of participants who fulfill all of the criteria: interest and engagement with science and representation in underrepresented groups and underprivileged backgrounds. However, until that happens, NMNH needs to continue aggressive marketing to the groups they wish to see in the program, and attempt to find ways of ensuring that the program is not simply “preaching to the converted” – that it is available for the children who might be in the position to benefit most greatly from it.

**Career Aspirations and Further Participation in SI Programs**

Congruent with this, one of the goals of this assessment was to determine whether the camp had a positive effect on the career aspirations of these participants. The answer must be, again, a qualified “yes.”

When asked “What do you want to be when you grow up,” approximately four out of five had a ready answer (the others saying they did not know). The answers varied, but most clustered around: 1) careers in medicine (whether “a doctor” generally or, more specifically “a neurologist,” “gynecologist,” “nurse,” etc.); or 2) careers in science (generally specific – “a paleontologist,” “forensic pathologist,” “epidemiologist,” etc.). Those not interested in these two groups of careers were rare, and their answers varied—“a chef,” “an ambassador,” “a teacher.” Three of the four African American boys mentioned that they aspired to be professional athletes when they grew up.

That having been said, the already-established interest in science (and specificity of career goals) also raises questions about whether this program is currently “preaching to the choir.” If they already aspire to be scientists, it is unclear whether this program is having as much social impact as it might otherwise have.

By the end of the week, six of the forty participants had shifted their career goals toward one of the careers they had seen in the camp, usually towards forensic anthropology or astrophysics. This can be attributed to the compelling scientists they met during the Forensic Anthropology roundtable and the Meteorite Lab tour. As such, it seems the key to shifting career aspirations is allowing them to meet exciting people in the field, and observe some of the most exciting things they are doing.
When asked whether they might be interested in participating in further SI programs, all participants indicated they were. Whether this desire will turn into action is unknown, but all seemed at the very least casually interested in the YES program.

**Disciplinary Issues**

Middle school is a difficult time. Maintaining good order and discipline within a group of twenty middle school-aged children can be a challenge. This is especially true in a program that has the contradictory purposes of being a summer camp, and thus, ostensibly, full of freedom, play, and exploration, and being housed in a museum/research environment that often has many (necessary) restrictions against those very things.

In the first week a number of disciplinary issues arose consistently, particularly among a small number of boys. These boys were regularly disruptive and occasionally even destructive to the activity equipment. This was particularly evident when the entire group worked together – on a number of occasions it devolved into half the cohort misbehaving along with this smaller disruptive group while the other half watched them misbehave. The organizers struggled to control these children, utilizing a number of strategies with only moderate success. For example, isolating them from one another and the group was a useful tactic that was occasionally employed. However, it was observed in the first week that some of the organizers resorted to shouting on a regular basis in an attempt to maintain order. This often had the opposite of the intended effect; the disruptive ones (immune to shouting) continued their disruptive behavior unfazed, whereas the others were intimidated. This led two of the participants to describe one of the organizers as “scary.” The disruptive behavior became such a pressing issue that the OP&A observer raised his concerns with one of the senior organizers on Thursday of the first week. From then on, the yelling abated, though discipline continued to remain an issue.

The second week was markedly better. While two of the participants self-reported autism-spectrum social difficulties, none of the participants were consistently disruptive/destructive. Furthermore, perhaps as a byproduct of their experience with the previous week, the organizers consistently seemed more at ease and confident in their interaction with the participants. Some of the rules were relaxed – particularly about use of cell phones (which caused a moment of angst in the previous week when a girl was accused of using her phone at an inappropriate moment). As a result, there were no significant disciplinary issues in the second week.

That said, there is nothing to say that there will not be another cohort with disruptive children in the future. Middle school-aged children are not all angels. It is important for NMNH to work on strategies for managing children in this age group—and if possible receiving training on this. Their greatest asset in this is each other. While the staff worked together effectively during this program,
there are additional strategies they could develop for working together as a team to manage any difficulties and make the program as enjoyable as possible for everyone.

Another related, very difficult question is whether to remove a child who is consistently being disruptive. This should, of course, be only used as a last resort; no one wants to eject a child from the program who might benefit from it. Furthermore, no one wants to face any potential fallout – parental complaints or other issues – that might arise. That said, there are situations where a child is so disruptive that it has a consistently negative effect on the experiences of the rest of the group (and unfortunately the disruptive child is likely not learning much from the program). The organizers should develop very clear guidelines for when “enough is enough” to warrant expulsion from the program. Furthermore, parents should be very clearly informed that if their child is consistently disruptive, he or she will be excused from the program.

**Activity Format: Summer School or Summer Camp?**

An overarching issue intimately related to the one just discussed revolves around the design of the activities, their appropriateness for this age group, and the setting of a summer camp. One of the goals of the program, as stated in the grant proposal, was to: “Invite to learn in ways that are effective for adolescents (which are not necessarily how they learn in school) through inquiry-centered, active, immersive, real-world experiences.” For the most part, this approach was not observed. With few exceptions, almost all of the activities described above were presented in a format and style that closely mimics those encountered in school. They had lectures from experts delivered either in person or via video conference, worked on activities in small groups, and then presented them to the others in camp, or they were given closely-monitored guided tours. This “school” approach limited engagement by the participants. The participants would regularly couch their praise and criticism of the day’s activities in terms of whether it was “fun” or “boring.” Unfortunately, there were some activities (the Bee walk, the field book activities, some of the roundtables) that they consistently found boring, and many to which they gave mixed reviews. In relation to the issue of disruptive behavior, activities that are boring will naturally lead some participants to misbehave in an attempt to keep themselves occupied. Participants regularly mentioned: “I wanted a break,” “I wish there was a time we could just play games,” “I think some time each day we should be able to do what we want.” It is critical to reflect on the nature of a camp where the participants are asking, essentially, for recess.

Contrast this with the “The Amazing Race” activity. At its core, this activity is a small-group museum tour re-thought with “game” elements included (team-based competitive nature, focus on self-guided exploration and experimentation rather than on following strict rules, a basic reward mechanism). Without these game elements, the activity would likely have been regarded as a boring or simply forgotten by most participants. Instead, it – a simple museum tour that required
the participants only to find, rather than to explore, the objects and locations in the museum — was mentioned as one of the favorite activities of the week (as in, “I loved that race we did at the beginning of the week, that was really fun” or, when asked of their favorite activity, “the Amazing Race, definitely”). The engagement that participants felt with the race had little to do with the activity itself, and much more to do with the way that it was presented.

As such, it is absolutely crucial that some of these activities be re-thought to ensure that they are presented in as “fun” a manner as possible, and, wherever possible, should integrate game-mechanics into the activities. “Gamification” — integrating game elements into non-game activities to improve engagement — is something that has been explored frequently in business and is becoming a useful tool in the educator’s arsenal. OP&A highly recommends that the organizers revisit the design of most of their activities with this in mind. Furthermore, the organizers of the camp, in almost all activities, fell into one of two roles: either hands-off facilitator, or instructor – both authority-figure roles. On no occasion did they get their hands dirty and “play” along with the children. This seems like a lost opportunity — while the organizers should not dominate the activities, there should be leeway for play and exploration. OP&A is not advocating that all activities be presented in this way — it may not be possible. However, we recommend that at least one activity per day be done in this exploratory, playful, game-infused fashion in a way that has been specifically tailored to appeal to this age group. Furthermore, it is important, when scheduling, to ensure the participants are not given too many consecutive hours of front-forward lectures at a time. For example, on Tuesday of the second week, the after-lunch schedule was comprised of a panel presentation by participants in the YES program, followed by a video lecture by the Smithsonian Astrophysical Observatory. Some participants observed that: “It was really interesting, but I fell asleep,” or “there was too much sitting down,” or “it was pretty boring.” Had these activities been split up, scheduled for different days, or involved more than sitting and listening quietly, they might have been less sleep-inducing.

A further design point is that there were often so many activities scheduled with such tight time scales that each activity felt rushed. This led some participants to complain that they needed “more breaks” or “more time for each thing” — that is, they were asking for a more relaxed atmosphere. On one occasion, an activity overran, causing a truncated lunch break. Predictably, this did not go over well and elicited a number of complaints.

In summary, it is understood that many of the goals for this camp pertain — explicitly or implicitly — to teaching and learning about science. However, the program can only improve if these are presented in a fun-filled way that will make the participants naturally enthusiastic about science; this approach will have a far greater impact on their interest in science in the future than a summer full of lectures — no matter how compelling. In short, the program should consider focusing less on “teaching” and more on “inspiring.”
“Behind the Scenes”

One of the most consistently-voiced expectations of participants in their initial interviews was to go “behind the scenes” in the museum. The camp, they felt, was their opportunity to “do something special” and, thus, to feel special and privileged. Their comments – even unrealistic ones like that they “have badges like yours that open the doors” – reflects this desire both to role-play working for the Smithsonian, but also having special privileges and to be given, in essence, backstage passes to see the secret workings of a place with which many were already familiar from the outside. Unfortunately, many participants, especially in the first group, came away unsatisfied. They wanted more behind-the-scenes tours, particularly because that aspect of the camp had been highlighted in the marketing materials and pre-camp orientation meeting. This led OP&A’s researcher to inquire what the participants considered “behind-the-scenes” in order to understand what they found lacking. The activities they most consistently felt were behind-the-scenes were the Forensic Anthropology activity and the Meteorite Vault activity. They said they wanted to see more of what the scientists in the museum did, and where they worked – perhaps unsurprising considering that they were led through perhaps-fascinating science departments full of offices, scientists, and artifacts on their way to... a conference room.

It is understood that many scientists would hardly be thrilled to have a group of perhaps unruly middle-schoolers interrupting their day. That said, if the marketing materials are going to promote that the participants will be going behind the scenes as heavily as they do, the organizers should find a way to incorporate more interaction with the working departments of the NMNH – whether curatorial or research.

A further disappointment happened with the trip to the zoo in the first week. Because of a cancellation of the head zookeeper, the participants essentially were treated to a normal trip through the zoo. This led to a number of complaints that it was “the same as when I went with my school” or “not really behind-the-scenes.” It is important for the organizers to have a stock of back-up activities ready for such occasions – especially when the cancellation of one key person can deflate an entire day.

Research and Curation

The NMNH has a dual purview. On the one hand, it is, as the name states, a public-facing museum, presenting the latest scientific research. On the other hand, it is a world-leading scientific research institution. In its advertising materials as well as its grant applications, the focus of this program seems to be largely on the latter – the NMNH as a science center – rather than the former. However, the program as executed seems split between these two foci. On the one hand were the activities with the SI scientists, and on the other were the “Curation 101” activities. Generally speaking, the participants seemed less interested in and engaged by the Curation 101 activities –
some of which were not very compelling for this age group (such as critically examining museum labels), and were presented in a manner that was regarded as “like school.” Participants generally enjoyed conducting observations of museum visitors, largely because they felt they were being allowed to do something “naughty” (they regularly called it “stalking” or “creepin’ on people”). Overall, the Curation 101 activities lacked internal cohesion (nor was there a final product, due to the cancellation of the Tumblr activity). They also do not really seem to fit the stated project goals of increasing interest in science or taking on science-related careers. OP&A’s researcher believes strongly that there should be both an overarching theme of the camp, reflected in a product that participants can take home and show to their peers and parents; initially the Tumblr project was supposed to fill this role, but nothing replaced its abrupt cancellation. The Curation 101 theme either should be rethought or removed.

**Program Activities**

The program involved a range of activities; most were consistent between the two sessions. There were three exceptions: 1) the Forensic Anthropology Roundtable was replaced by the Entomology Bee Walk in the second week; 2) all the activities planned for the Zoo Trip in the first week were cancelled due to a last-minute cancellation by the Zookeeper; and 3) the Ship-to-Shore Roundtable was replaced with a roundtable with four participants in the YES program in the second week.

**Q?rius Expedition**

This was a series of activities done in the new education center. In it, the participants were asked to try out the various activities being developed for school groups in the education center: the exploration tables (where they completed a number of hands-on activities designed for visitors to the education space); thematic curation (where they gathered artifacts from the wall according to a theme); and a lab exercise (where they went through exercises using lab equipment to determine the species of a bird involved in a bird-strike incident).

**The Amazing Race**

The participants were split into groups of five and sent on a scavenger hunt through the museum. They were given an object or exhibit to find; when they found it, they were to return to their base camp where they had to report directions from the Q?rius space (their base camp) to their target in order to get the next objective.
**National Zoo Trip**

The participants met at the National Zoo. In the first week, the last-minute cancellation by the Zookeeper limited the visit to a “scavenger hunt” and meetings with Zookeepers. In addition to seeing the animals, participants were occasionally permitted to go into staff-only areas (such as the Asian Otter exhibit), as well as seeing some of the animals up close as they were being fed.

**Entomology Bee Walk**

In this activity, the participants were taken outside to the NMNH butterfly garden. There, they were given iPads and asked to take photographs of bees they observed on flowers in certain sections of the garden. They were then asked to hypothesize why bees preferred some flowers to others.

**Career Exploration with Smithsonian Astrophysical Observatory (SAO)**

This activity was in two sessions. In the first session (on the first day), participants were instructed in how to use the Observing With NASA website[^3] to take photographs of astronomical bodies using the Micro Observatory Robotic Telescope Network. Later in the week, there was a conference call with SAO at Harvard. Through the video chat, participants were introduced to the work of SAO, shown a few of the telescopes, and given instructions on manipulating photographs of astronomical bodies (like those they took on the first day) using SAO-developed software.

**Meteorite/Mineral Science Tour**

The participants were taken to the NMNH meteorite vault, where they met a meteor scientist who introduced them to the meteors stored there and allowed the children to handle many of them.

**Ship-To-Shore Roundtable**

In the Q?rius theater space, the children participated in a conference call with the NOAA ship *Okeanos Explorer*, which is currently exploring the ocean floor. They observed the video sent back by the *Explorer*’s submersible, and had a Q&A session with one of the scientists aboard.

**Introduction to Fieldbook/Observation for Experts**

This activity introduced the participants to the concept of object examination. In groups of two or three they were given an artifact and asked to write down “Everything you’d need to know to describe it to someone else” in five minutes. After that was done, they were given copies of excerpted scientific field books, and asked to compare and contrast them. They then went into the museum to conduct their own observations of artifacts.

**Forensic Anthropology Roundtable**

The participants met one of NMNH’s forensic anthropologists, who had prepared the room with a number of disassembled human skeletons. They were then instructed in how to reassemble the skeletons, and shown how a forensic anthropologist goes about determining cause of death and other life-events from skeletal remains.

**Curation 101**

The participants met one of the NMNH’s curators, who, over three days, introduced them to the art of museum curation. They were led on exercises to observe objects in the museum and visitors to the museum, reading and writing museum labels, and curating their own exhibit from the artifacts in the Q?rius space.

**Fieldbook Tumblr**

It was intended that the participants would collect the work they had done during the week into a web presentation either on Tumblr or the SI blog. However, due to apparent late-arising legal issues, this had to be cancelled. It was replaced by a creative activity on the final day where the participants produced poetry, songs, or music videos about some of the things they had seen in the museum.
<table>
<thead>
<tr>
<th>Activity</th>
<th>The Amazing Race</th>
<th>Introduction to Field Book/Observation for Experts</th>
<th>SAO Photographs</th>
<th>National Zoo Trip (week 1)</th>
<th>National Zoo Trip (week 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule</td>
<td>Morning day 1</td>
<td>Afternoon day 1</td>
<td>All of day 2</td>
<td>All of day 3</td>
<td></td>
</tr>
<tr>
<td>Leadership Style</td>
<td>Participant group-led</td>
<td>Front-forward lecture/presentation, small group, individual</td>
<td>Individual activity</td>
<td>Leader-led large group guided tour</td>
<td>Leader-led large group guided tour</td>
</tr>
<tr>
<td>Features</td>
<td>Competitive, game, museum exploration</td>
<td>Learning, school, observation</td>
<td>Hands-on, computer activity</td>
<td>Scavenger hunt, zoo tour</td>
<td>Zoo tour, behind-the-scenes</td>
</tr>
<tr>
<td>Environment</td>
<td>NMNH Museum</td>
<td>Conference room, NMNH museum</td>
<td>Conference room</td>
<td>National Zoo</td>
<td>National Zoo</td>
</tr>
<tr>
<td>Task</td>
<td>Find locations in NMNH, report directions to base camp for team ‘points’</td>
<td>Began with a lecture on observation, taxonomy and classification. Then compare/contrast scientific field books. Then observe a museum artifact. Then go into the museum and conduct an observation.</td>
<td>Use the Micro Observatory website to program a telescope to take of astrophysical bodies for use in their final project.</td>
<td>Morning: Guided ‘hunt’ for animals through the zoo. Afternoon, guided tour of the zoo.</td>
<td>Morning: Backstage with Otters, Sloth Bear show, feeding the pandas, zebras and big cats with zookeepers. Afternoon: tour of the zoo.</td>
</tr>
<tr>
<td>Observed Engagement Level</td>
<td>High, flagging toward the end due to fatigue.</td>
<td>Lecture: low. Field book observation: low/medium (many had difficulties). Objects: Medium—some were quickly bored.</td>
<td>Medium; some frustration with the software.</td>
<td>Generally good.</td>
<td>Generally very good.</td>
</tr>
<tr>
<td>Reported Enjoyment</td>
<td>Good; except ‘too much walking’ and frustration that some objectives were ‘impossible’.</td>
<td>Mixed, generally bad. Lecture: ‘Boring’. Observation of objects ‘sort of interesting’.</td>
<td>Mixed. Some enjoyed it, others, due to the introduction, had anticipated being able to ‘control the telescope’ (as if with a joystick). Consider careful wording to avoid confusion.</td>
<td>Complaints: ‘the same as when my school went to the zoo’; Desire to see ‘Behind the scenes’. ‘Too much up and down and up and down’ (too much walking). Many complaints about heat and fatigue. The scavenger hunt was generally regarded as ‘too easy’.</td>
<td>Complaints: Wanted to see more ‘behind the scenes’, meet/observe scientists. Dislike of the invertebrate house. Some complaints about heat and fatigue. Some expressed worrying wishes to inappropriately interact with the animals: “Ride the elephants”, “…see two animals fight”, “feed the lions”</td>
</tr>
<tr>
<td>Suggested Revisions</td>
<td>Amend to require less back-and-forth walking to base camp. Incorporate a need for the teams to learn about the objects/exhibits rather than only find directions to them. Alter ‘red herring’ objectives to ones that require more critical</td>
<td>Very much like school. The lecture seemed unengaging and too-technical for this age group and camp setting. Cut in favor of more exploratory time. Observation of objects and field books very dry; try to incorporate game/exploratory elements. Some quickly bored of observing museum objects. If possible, make it fun.</td>
<td>Change the scheduling so this is done after the video conference with the SAO. No reason not to, and the conference introduces it much better. Also, these photographs were never seen or used again—ensure all activities which have a product like these contribute to a final project.</td>
<td>Have more compelling exercises devised in the event of a speaker cancellation. Consider splitting into small groups for activities to allow all to participate. Take more breaks.</td>
<td>If possible, schedule meetings with zoo scientists and more actual behind-the-scenes tours (like with the Otters). Also discuss with the participants the purpose of the zoo to differentiate between conservation and entertainment; zoo and circus.</td>
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<table>
<thead>
<tr>
<th>Activity</th>
<th>Q?ruis Expedition (1)</th>
<th>Curation 101 (1)</th>
<th>Forensic Anthropology Roundtable (week 1)</th>
<th>YES Roundtable (week 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule</td>
<td>Morning day 2/3</td>
<td>Morning day 2/3</td>
<td>Afternoon day 3</td>
<td>Afternoon day 3</td>
</tr>
<tr>
<td>Leadership Style</td>
<td>Small group activity</td>
<td>Lecture and subsequent individual activity.</td>
<td>Lecture with accompanying small-group activity</td>
<td>Lecture and whole-group Q&amp;A</td>
</tr>
<tr>
<td>Features</td>
<td>Guided activity, hands-on</td>
<td>Lecture, guided activity</td>
<td>Lecture, hands-on, interactive</td>
<td>Lecture</td>
</tr>
<tr>
<td>Environment</td>
<td>Q?ruis loft</td>
<td>Q?ruis loft</td>
<td>Conference room</td>
<td>Conference room</td>
</tr>
<tr>
<td>Task</td>
<td>Complete activities designed for school groups in Q?ruis, debrief with Q?ruis evaluation staff</td>
<td>Lecture from SI curator, observe objects in Q?ruis space.</td>
<td>Participants were given human remains to reassemble, then discuss cause of death.</td>
<td>Participants were given a lecture about the YES program, then had a Q&amp;A with YES participants.</td>
</tr>
<tr>
<td>Observed Engagement Level</td>
<td>Generally high, but in week 1 waned toward the end, with some becoming disruptive/destructive.</td>
<td>Medium. Some were engaged, while others quickly got bored.</td>
<td>Very high—many were enraptured.</td>
<td>Low. Some fell asleep, some were playing with phones.</td>
</tr>
<tr>
<td>Reported Enjoyment</td>
<td>Generally good: ’I liked the birdstrike thing’, ’I really liked that Mars activity downstairs’. Some felt too crowded or too long.</td>
<td>Unmentioned in comments—forgettable.</td>
<td>Very high. Consistently reported as best event of the camp. Two found it ’a little creepy’.</td>
<td>Generally ambivalent. A few liked learning about YES, but some thought it was ’boring’, ’too quiet’ and ’I fell asleep’.</td>
</tr>
<tr>
<td>Suggested Revisions</td>
<td>This is designed for school groups, and as such is well designed for these ages—even though it felt very much like a school activity (if a well-designed one). That said, once Q?ruis opens, some may feel as though they are not doing something ’behind the scenes’.</td>
<td>While participants seemed engaged at the time, none mentioned having even done this activity (let alone whether they enjoyed it) in subsequent discussions. As a result, it should be revised in order to make it more consistently interesting, or scrapped.</td>
<td>Do this again, and more like it. It was an excellent combination of a very compelling speaker, unique objects and a fun activity.</td>
<td>YES speakers were too quiet; better to split them up and have them meet and speak with small groups of the kids on a rotation ’speed dating’ style. Perhaps consider more of a ’show and tell’, otherwise it becomes a bit dry.</td>
</tr>
<tr>
<td>Issues</td>
<td>None.</td>
<td>None.</td>
<td>None.</td>
<td>YES speakers were too quiet.</td>
</tr>
<tr>
<td>Activity</td>
<td>Schedule</td>
<td>Leadership Style</td>
<td>Features</td>
<td>Environment</td>
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<tr>
<td>Career Exploration with SAO</td>
<td>Afternoon day 2/3</td>
<td>Video Conference, Individual Activity</td>
<td>Lecture, scientists, hands-on computer activity</td>
<td>Conference room</td>
</tr>
<tr>
<td>Q?rius Expedition (2)</td>
<td>Morning Day 4</td>
<td>Group activity</td>
<td>Group activity, exploratory, self-guided, hands-on</td>
<td>Q?rius</td>
</tr>
<tr>
<td>Curation 101 (2)</td>
<td>Morning day 4</td>
<td>Lecture, individual and group self-led activities</td>
<td>Lecture</td>
<td>Q?rius, NMNH museum</td>
</tr>
<tr>
<td>Ship-to-Shore Roundtable (Week 1)</td>
<td>Morning day 4</td>
<td>Video Conference</td>
<td>Lecture, scientists, Q&amp;A</td>
<td>Q?rius Theatre</td>
</tr>
<tr>
<td>Entomology “Bee Walk” (Week 2)</td>
<td>Afternoon day 4</td>
<td>Brief lecture, group activity</td>
<td>Scientist, hands-on, outdoors</td>
<td>Butterfly Garden</td>
</tr>
</tbody>
</table>
Issues this at home so that they will continue to use the SAO website and may become interested in this further—link with the other SAO activity. for a school group, might be best paired with an activity before or after that is more playful. love of science it seems misplaced. Consider replacing with something else. run into lunch time as that will upset many. Consider another speaker, and utilize digital cameras instead of iPads.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Meteorite/Mineral Sciences Tour</th>
<th>Curation 101 (day 3)</th>
<th>Butterfly Pavilion Tour</th>
<th>Final creative exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule</td>
<td>Afternoon day 4</td>
<td>Morning day 5</td>
<td>Afternoon day 5</td>
<td>Afternoon day 5</td>
</tr>
<tr>
<td>Leadership Style</td>
<td>Lecture, group activity</td>
<td>Group activity</td>
<td>Guided tour</td>
<td>Small group activity</td>
</tr>
<tr>
<td>Features</td>
<td>Scientist, lecture and hands-on activity, behind-the-scenes</td>
<td>Group activity, self-guided</td>
<td>Museum tour, exploration</td>
<td>Creative, exploratory, small group</td>
</tr>
<tr>
<td>Environment</td>
<td>Meteorite lab</td>
<td>NMNH</td>
<td>NMNH</td>
<td>Q?ruis</td>
</tr>
<tr>
<td>Task</td>
<td>Listen to lecture by meteorite scientist and pass around meteorites from the lab.</td>
<td>Go into a section of the museum and record observations of artifacts along the theme ‘hidden surprises’ for their own ‘exhibit’.</td>
<td>Walk through the butterfly pavilion.</td>
<td>To wrap up, the kids were asked to develop a creative piece (film, song, dance, etc) based upon the artifacts they had observed in that morning’s Curation 101.</td>
</tr>
<tr>
<td>Observed Engagement Level</td>
<td>High. Most were fascinated by the objects, even to such a degree that discipline occasionally became an issue.</td>
<td>High. Some interpersonal conflicts within the groups regarding which objects to choose.</td>
<td>High. This was generally enjoyed by all.</td>
<td>Very high. They thoroughly enjoyed the creative aspect of this, and many took to it with relish.</td>
</tr>
<tr>
<td>Reported Enjoyment</td>
<td>Very high. Consistently one of the highlights of the week. They particularly praised their ability to handle rare, precious and expensive artifacts.</td>
<td>Generally high—tied to the final creative exercise.</td>
<td>Generally went unmentioned. I am not inclined to say this was thus not enjoyed, but, being a part of the typical museum experience it may not have ranked as particularly extraordinary. A good, easy, crowd-pleasing back-up exercise in case something else falls through.</td>
<td>Did not get a chance to speak with them after doing this activity, but observations indicated that they were enjoying themselves.</td>
</tr>
<tr>
<td>Suggested Revisions</td>
<td>Do this again. The only complaints were a lack of chairs and that standing for over an hour became difficult. The speaker was compelling and the artifacts extraordinary.</td>
<td>None. This seemed to work well as a way of gathering material for their final creative project, and thinking about museum curation (if that is going to continue being a goal of the camp).</td>
<td>None.</td>
<td>This is an excellent example of the sort of activity that should be done more consistently. The creative component inspired the participants in a way I had rarely seen over the course of the week, and gave them the playful freedom to</td>
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</table>
In the second week, presenting the final products for this ran over time.

<table>
<thead>
<tr>
<th>Issues</th>
<th>None.</th>
<th>None.</th>
<th>None.</th>
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explore and express their personal interest in science. Essentially, try to make some of the other activities more like this one. The only comment is that this was not wholly summative—it was only related to what was done earlier in the week.