

Outdoor Exploratorium - Front-End Evaluation Open-Ended Exploration with a Noticing Toolkit at the Palace of Fine Arts

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PURPOSE

The Outdoor Exploratorium Project is a five-year project, funded by the National Science Foundation (NSF0104478), that aims to encourage and support visitors in noticing the subtleties of the outdoor environment. The study described here is one in a set of evaluation studies conducted for this project. It is a first look at what and how visitors notice in the area immediately outside the Exploratorium at the Palace of Fine Arts. In particular, we look at visitors' experiences with a noticing toolkit, a set of simple tools we gave visitors to encourage them to explore the outdoors. The study 1) categorizes what visitors noticed and what caught their attention, 2) gauges participants' reactions to an open-ended exploration and noticing activity, and 3) identifies what tools visitors used, how they used it and what, if anything, was frustrating about each tool. The results are intended to inform the content and activity development for the Outdoor Exploratorium Project, in general, and future development of an outdoor noticing tool shed, in particular.

METHODS

Participants

Study participants were recruited from the Exploratorium Membership. We sent an email message to members one week before the first interviews asking for help with the Outdoor Exploratorium Project. (The email message can be found in Appendix A.) The message asked for adult individuals, adult groups and groups with adults and children 10 years and older to come to the Exploratorium for about one hour to participate in an outdoor noticing activity. Twenty-three members signed up for a timeslot of which twenty came at their appointed times and completed the activity and the subsequent interview:

Adult individual	6
Adult group	5
Group with adult and child	9

This initial study recruited Exploratorium members only; future studies will draw from the broader visitor population.

Activity

Participants were asked to come at their scheduled time. Each participant or participant group worked independently and was not asked to work with other study participants whom they did not know.

Participants were given a short, 5-minute orientation to the activity, an outline of which can be found in Appendix B. As part of this orientation, the study participants were given background information about the Outdoor Exploratorium project and what they would do as part of this study: to spend about 35 minutes outside to explore and notice the area around the Exploratorium. They were encouraged to stay close to the Exploratorium and to NOT spend all their time around the lagoon.

Participants were given a toolkit containing these items to help with their exploration:

- Clipboard
- Forceps
- Latex Gloves
- Paper
- Pencil
- Plastic Ziploc Bags
- Roll of Transparent Tape

They were also asked to select 3 tools they would like to take outside with them from the following choices:

- Cardboard cones
- Clay / Plasticine
- Color Pencils
- Compass, Thermometer, Whistle
- Flashlight
- Hand mirror
- Magnets
- Magnifying glass
- Petri-dish
- Stethoscope
- Tape measure
- Telescoping mirror
- Test tubes (large and small)
- Tracing Paper

We told participants that they did not have to use all or, in fact, any of the tools if they did not want to, and we encouraged them to use the tools they came with, their eyes, ears, nose, mind, etc. We also showed them how other people, staff members, used the tape.

Each group was then asked to come back to a designated room for a follow-up interview conducted by an evaluator. These were open-ended interviews, lasting from 15 to 30 minutes, designed to have the study participants reflect on their experiences outside. The interview questions are in Appendix C.

RESULTS

We analyzed the participants' experience with this noticing activity in three different ways. First, we looked at what the study participants noticed and what caught their attention. Then, we examined what participants thought about the activity itself. Finally, we took a closer look at how the tools were used in this noticing experience.

In this study, unless otherwise noted, the unit of analysis is the participant group.

What Participants Noticed

What did visitors notice? (Or, what caught visitors' attention?)

We looked over the samples visitors collected, visitors' notes, and visitor interviews to identify what visitors noticed during their outdoor exploration. We analyzed the data using two coding schemes. First, we looked at the *types of objects* visitors noticed. Second, we looked at the *types of relationships* visitors noticed and/or asked questions about. The first coding scheme is object oriented and gives us an idea of what things visitors easily notice and what things visitors don't tend to notice without additional help; the latter identifies different types of questions and types of noticing that we may wish to support to help visitors make sense of and further explore what they notice.

- Types of objects visitors noticed

Table-1 lists the types of objects visitors noticed during their time outside the Exploratorium. They are broadly organized into 9 object categories. We also provide examples of each object type to better describe that category.

Table 1. Types of objects

Type of Object
<p>FLORA (20/20 groups mentioned noticing this type of object) e.g.</p> <ul style="list-style-type: none"> – Trees (including different species such as pine, cypress, and eucalyptus) – Flowers (including different types of flowers such as dandelions and daisies) – Parts of trees including stumps, branches, leaves, roots, seeds – Parts of flowers such as pollen and stamen – Grass – Moss – Fungus
<p>FAUNA –excluding humans (18/20 groups mentioned noticing this type of object) e.g.</p> <ul style="list-style-type: none"> – Signs of animal life including gopher holes, termite nests, excrement – Animals parts such as feathers, wings – Insects, ants, spiders – Turtles – Swans, ducks – Fish

Type of Object

ROCKS/MINERAL/WATER (15/20 groups mentioned noticing this type of object)

e.g.

- | | |
|-----------------|-----------|
| – compost piles | – rocks |
| – dirt | – sand |
| – lagoon water | – sawdust |
| – mud | – soil |

LITTER/TRASH (15/20 groups mentioned noticing this type of object)

e.g.

- | | |
|------------------------------|-------------------|
| – cigarette, cigarette butts | – newspaper |
| – Exploratorium sticker | – pollutants |
| – food and wrappers | – shards of glass |
| – graffiti | |

PEOPLE (16/20 groups mentioned noticing this type of object)

e.g.

- | | |
|-------------------|-----------------------------|
| – Bride and groom | – my hair |
| – footprint | – nonchalant people |
| – foreigners | – snippets of conversations |
| – languages | – strollers |

ARCHITECTURE – in particular structures at PFA and other ‘artistic’ structures (12/20 groups mentioned noticing this type of object)

e.g.

- | | |
|------------|----------------------|
| – Carvings | – golden gate bridge |
| – Columns | – rotunda |
| – Friezes | – Water fountain |

INFRASTRUCTURE (20/20 groups mentioned noticing this type of object)

e.g.

- | | |
|-----------------------------|--------------------------|
| – asphalt | – fences, walls |
| – bldg paint | – freeway , street, road |
| – buses, cars, car insignia | – grate, meter cover |
| – drain, pipes, sewer | – traffic flow and noise |

WEATHER (10/20 groups mentioned noticing this type of object)

e.g.

- | | |
|---------------------|---------------|
| – clouds | – sunlight |
| – cool breeze, wind | – humidity |
| – dew | – temperature |

OTHERS

e.g.

- | | |
|--------|------------------|
| – fire | – the tools used |
|--------|------------------|

This coding scheme can be used to describe what visitors notice outside and can be applied across different sites. These particular findings (i.e., the percentage of groups that noted these objects) are, however, specific to this study site and will not likely

transfer to a different setting. We will need to conduct further studies to see what objects attract visitors' attention at the particular site we wish to help visitors explore.

- Types of relationships visitors noticed and/or asked questions about
- Table-2 lists the types of relationships visitors noticed and described and/or asked questions about. Examples of each relationship type are provided to better illustrate each category.

Table 2. Types of questions

Types of Questions
<p>IDENTIFICATION (14/20 groups asked this type of question)</p> <p>What is this?</p> <p>2C-G: What kind of fish [live in the lagoon]?</p> <p>9C- : Bushy plant, I still don't know what it is. They should show the name of it.</p> <p>12C-W: if I were studying plants, I would id what they were.</p> <p>What is it made of? / What are its parts?</p> <p>10G-M: Paint peeling off the door, wondering if there's lead in the paint, what it's made of.</p> <p>16A: /From visitor's notes/ <i>Acoustic Hierarchy:</i> <i>West Lot - Traffic Noise (largest share From elevated highway to west)#1</i> <i>Vehicle traffic in lot #2</i> <i>People #3</i> <i>Wind in trees (today) 10/23 #4</i></p> <p>18C-B1: What is the flame made of? Is it gas or chemical?</p>
<p>HISTORY (14/20 groups were curious about change over time)</p> <p>How does this change over time?</p> <p>4A-M: I wanted to see things that were changing, how a web was decaying... It would be nice to see how things change around the building. What's different about building paint or during different times of the year?</p> <p>What happens during different times of the year/month/week/day?</p> <p>3A-W:I see it [wedding] on weekends but why on Friday?</p> <p>16A-M: I wanted to know about sun angles. In the wintertime it's going</p>

to be afternoon, the amount of direct sunlight won't be hitting the [parking] lot.

How long does it take for xxx to happen?

2C-B: [I want to] figure out how long bacteria forms on dew in leaves.
How long it takes for things to grow in water?

What is its history?

9C-B: Plaque that could have been left there after 50 years.

12C-W: There's a couple of places where the fence was broken. Maybe a tree fell or a car bumped it.

17G-M: footprints around a manhole. When did this happen? Why was it in such a state that people can wander around it?

BEHAVIOR (11/20 groups were curious about how something acted or behaved)

How does it behave?

11G-M: I was surprised at how nonchalant people were about us walking around with all that equipment

14C: /from visitor's notes/ *Movements of the sky = e.g. clouds moving*

18C-B: testing how fast swans ran... It tried to fly, pushed against the ground with its wings

19G-W: turtles doing yoga

COMPARISONS (13/20 groups were curious about the difference between two similar things)

How is xxx different from yyy?

2C-B: What's with the dirt? Two kinds of dirt was kind of weird

5A-W: [I collected] composted leaves to compare to un-composted leaves... interesting if thermometer show large enough difference

9C-B: /describing samples of soil collected in test tubes/ from lawn, it probably has more nutrients

13C-W: Noticing different trees on different sides of the building, e.g. no willows on the west side, but there are willows on the south side...Noticed on west side of building as we came near the entrance that more plants are growing out from building.

18C-M: There are casting holidays. Where it's flat, it's small. Where it's round, they're big.

RELATIONSHIPS BETWEEN OBJECTS IN ECOSYSTEM (14/20 groups were curious about how one object relates to another object)

How is xxx related to yyy?

4A-M: who's eating who?

8G-M: I was wondering how it interacted. I wonder if that cigarette butt has a relationship to this piece of dirt...How does it interconnect?

13C: /from visitor's notes/ how garbage (smashed soda cans, plastic bottles, candy wrappers,) "grow" under trees

Causal relationships – What causes xxx?

2C-G: Plants, they had more blossoms than others.

2C-B: maybe because of more dew?

4A-M: When I used stethoscope, it's very sensitive. When I held it against a tree, I think I felt a vibration of trolley car 20 feet away. I wasn't sure if it was through the air or the tree being vibrated.

12C-W: with a lot of trash I thought there would be more ants

How is xxx affecting/ affected by its environment?

12C-W: see pollutants in the area, and tree spots and mold on the fence

15A-W: It's a hard place for plants to live

17G: /from visitor's notes/ Also no squirrel noise - does noisy road or cold weather influence this?

OTHERS

How fast, how cold, how much?

10G: /from visitor's notes/ Wonder what speed the wind is blowing at

How does tool work?

19G-W3: more curious about how the stethoscope worked than anything else

We were curious as to whether visitors asked certain types of questions about certain types of objects they noticed. Table 3 summarizes the types of questions asked for each object type.

Table 3. Types of questions for types of objects

Type of Question	Type of Object (number of groups / total number of groups that asked that question type)							
	Flora	Fauna	Rocks	Litter	People	Architecture	Infrastructure	Weather
Identification	<i>9/14</i>	6/14	2/14	1/14	2/14	0/14	3/14	1/14
History	6/13	4/13	1/13	4/13	2/13	<u>2/13</u>	5/13	1/13
Behavior	0/11	<u>7/11</u>	1/11	0/11	<u>7/11</u>	0/11	0/11	1/11
Comparison	8/13	2/13	<u>5/13</u>	0/13	0/13	1/13	3/13	2/13
Relationship	<u>11/14</u>	8/14	2/14	<u>8/14</u>	2/14	0/14	<u>7/14</u>	<u>6/14</u>

The italicized cell in each row identifies the type of object for which the most groups asked that type of question. For example, most identification questions were asked about flora. The underlined cell in each column identifies the type of question that the most groups asked about that object type. For example, most questions about flora were of the relationship type.

This analysis gives an initial indication of the types of questions visitors wonder about when exploring the outside area around the Exploratorium at the Palace of Fine Arts. More generally, it indicates the types of questions that may arise in the course of outside exploration, which we may wish to help visitors answer or further explore.

The Activity

This section looks at visitors' reactions to the activity: open-ended exploration with a toolkit around the Exploratorium at the Palace of Fine Arts.

Was the experience worthwhile?

As part of their interview, we asked the study participants if, in general, their experience exploring and noticing outside was a worthwhile experience. Most groups (85%) thought the activity was worthwhile:

	Number of Groups (out of 20)
Worthwhile	17
Not worthwhile	1
Ambivalent	2

- Positive Reactions. Participants found the outdoor experience worthwhile for the following reasons:
 - Spending Time Outside (9/20) – Some participants said that they simply enjoyed spending time walking outside around the PFA area.

20C-M: I just want to be outside and walk

20C-W; [It's] nice to have a chance to walk outside

5A-W: I enjoy going out for walks. I do these things naturally ... every plant I say 'hi' to

- Noticing More and Differently (9/20) – Some participants appreciated the chance to notice things they haven't noticed before and from a new and different perspective

7C-M: ... fun to look in general and see things. [It's the] standard: see more than you expected to see.

4A-M: It's nice to be [able] to stop and look at things from a different perspective. I'm a busy person the rest of the week, and it's nice to stop and do very little and just observe in a very local area what's going on

- The Adventure of Exploration (4/20) – A few participants talked about how they enjoyed exploring on their own.

12C-W; the adventure is fun... It was our own adventure.

4A-M: it's nice to have on the outside, to have things very little happening so you sought it out yourself

- The Tools (4/20) – A few participants enjoyed using the tools and thought the tools made the experience worthwhile.

1A-W: to have a kit of parts and toolkit and investigate and see how exciting. The exciting part is the backpack and tools

2C-G: it had stuff like gloves

2C-B: you can have this stuff at home

2C-G: it's hard to find at home

10G-M: ... is enjoyable and especially with additional equipment

- Memories of Childhood (3/20) – A few participants mentioned that the experience reminded them of what they used to do as children.

3A-W: It was fun, a chance to let my mind go, to be a kid again. Let the child side come out.

11G-W: I think that as a kid I did stuff like this, so it felt familiar, but I liked it then and I still do.

- An Attractive Area (3/20) – A few participants talked about the attractiveness of the surrounding area, particularly the PFA.

6C-M: I like looking around the architecture... I love the architecture and stuff. I enjoy seeing that

2C-B: [the space] draws you into it

- Negative Reactions. A few members felt that the experience was not worthwhile. Two participants were bored and were not interested in what they found outside.

11G-M1: ... because actually after 10-15 minutes I was kind of bored. If I had only an hour, I would rather be inside.

19G-F3: I was tired. If there was more variety of things in the parking lot, well, there's the same kind of trees and bushes. I didn't feel like I would have discovered more things.

What concerns did visitors have about this activity?

We also looked through the interview transcript to identify other concerns that visitors mentioned about their experience exploring and noticing outside.

- A majority of the participants (12/20) thought we gave them too little time for exploring outside

1A-W: Frustration was not having enough time

9C-B: there was no time to go to the other side

16A-M: 35 minutes, I could spend a day out there

- Some visitors (5/20) were concerned about their own or their children's safety during this activity

2C-W: [I feel uncomfortable whenever I] lose sight of the kids... when they're not in line of sight

6C-M: ... lots of things you don't touch [in the parking lot]. So around that side [the lagoon, I] felt safer. You could take it easy. The cars made me very nervous.

19G-W3: I'm scared of bee stings.

- Some visitors (5/20) felt self-conscious exploring outside

4A-M: It would have been nice to do with a child or to know someone else was doing the same thing. I felt a little self conscious

2C-G: they stare at you when you take out test tubes

8G-M: At first I felt kind of awkward.

8G-W: I felt self-conscious but I enjoyed that

- Some visitors (5/20) felt uncomfortable because of the activity's open-ended quality

7C-M: [I felt] lost

7C-B: yeah

7C-M: it takes a while to open up

13C- W: [it was] disorienting. Not bad but we went out and now what do we do? But we had the feeling --- all but 5 minutes. This is really fun just looking and walking and sharing

18C-M: I am uncomfortable with unstructured activities. I didn't know if I was productive. It would have been better chopping wood because I know that I've accomplished something. It's typical of older people.

- Some visitors (4/20) found some aspect of the outdoors unappealing which they did not want to explore.

6C-M: We parked and come in on that [parking lot] side. ... [the lagoon] looks attractive. Parking lot is not attractive.

15A-W: I found vodka bottles and sleeping bags - not very nice. It was sad. I saw garbage, decomposed stuff lying around, not a real healthy habitat.... If Exploratorium cleaned up the garbage and gave clipboard then [it'll be a] letdown because [there's] so little biodiversity. It needs to be more than that.

12-C-W: We noticed a guy in the bushes. We didn't stick around there.

- Some visitors (4/20) were worried about disturbing the environment

2C-G: [I want to] pick for dirt, look in the dirt and move things.

2C-B1: That would cause erosion

2C-G: If I move a rock or a plant, that's erosion?

2C-B1: Yes

2C-W: ...If tape, then it'll be non-intrusive

7C-M: You can take clay impressions without destroying things

17G-M: we should let bugs [in the bag] go

17G-W: ... you can't have hundreds of people filling up bags

/bugs were set free by the interviewer at the end of the day/

How did visitors feel about the open-ended nature of this activity?

We were particularly concerned about the unstructured nature of this activity and asked the participants specifically about how they felt about the small amount of instruction and guidance they received. Responses were mixed.

- 8 groups did not want more instruction or guidance. These participants explained:

Interviewer: Would you have preferred more structure?

17G-M: no

17G-W: no because then I would only answer questions given and not poke around.

12C-W: The adventure was fun. It's cool that you didn't give guidelines.
That left us to our own devices.

- 3 groups wanted more instruction and guidance.

6C-F: [it would be better] if there's something to look for. They [the kids] get bored if something's not planned. They're boys and you just gave them equipment. If there was some point

- 7 Groups were ambivalent: either some members in the group wanted more while other members felt fine with the amount given, or an individual was not sure whether or not s/he wanted a more structured activity.

7C-B: Giving instruction would be worse

7C-M: It depends. If it lines up with what you want to do

7C-B: If it's focus on only one thing, then it's just one thing. It depends on the kind. Maybe it'll be worse.

10C-W: You can do what you want is the best part.

10C-G2: It's easier if someone tells you what to do. I choose both!

We also checked to see if the preference for structured activities was related to age. We were unable to detect a significant difference in the percentage of adults (8 out of 20) and the percentage of youths (2 out of 9) who asked for a more structured activity; Fisher's Exact Test, $p > .05$.

What supporting activities did visitors want?

Finally, we were curious about what may have made this a more worthwhile experience for the participants. When they were asked, participants indicated that the following supplemental activities would make their outside experience more worthwhile:

- Sharing the experience with someone else at the end of the activity (7/20)
 - 2C-G: a comment board / like in seeing/
 - 13C-W: It's nicer to have to report [back to someone]. It gives it some reason
 - 13C-B: reason to do it.
 - 11G-W: Say that the three of us had split up, it would have been good to come back and report on the different stuff that we found.
- Having explanations for what they notice outside (7/20)
 - 8G-M: On a lot of displays, you have "What's going on." The way my mind works, when I was looking at small area, I was wondering how it interacted. I wonder if that cigarette butt has relationship to this piece of dirt. How does it interconnect? It would have been cool to explore a little more. If you want it to be purely experiential, it's good as it stands. But if it's to learn, then more direction is good.

17G-M: Why did someone saw this [a tree branch] into disk? Is there a point? ... [I would like] people to show things to and answer questions.

15A-W: /talking about another outside walk/ the naturalist was effervescent with love of nature. He told people all these things about the crawlers they found. It enhanced the experience

- Identifying the plants and other things outside (6/20)

2C-W: I like to know what I'm looking at ... [I would have like to have had an] id book --- plants with names. There's a plant here I've seen on the road to Half Moon Bay. I've tried looking for it in a book but could not find it

9C-M: I was fascinated by one bush. It was like a rose, a pretty thing. They should show the name of it

12G-W: If I were studying plants I would id what they were.

- Creating artwork (5/20)

6C-M: ... come back and do things. Glue things down and make patterns

6C-W: If you had computers or digital cameras then they [the kids] can take pictures, then make collages.

8G-W: I felt like making art more than doing scientific experiments.

15A-W: Collect leaves and flowers and pound them on fabric for the color to make a quilt.

- Comparing what people found (5/20)

1A-W: [I would like to do this] with other people and compare our journeys

4A-M: I very much like to do this in a group of 10 people and see what I came up with and what other people came up with. See what other people found interesting.

13C-W: I don't know if it'll be competitive but it'll be interesting maybe if this is done with a group of people

- Analyzing what was collected (3/20)

2C-B: it would be interesting to look under a microscope. We won't make great scientific discoveries: its just interesting stuff

9C-B:I would examine them [the things collected] and test them if I had the right things, microscope and slides

Tools

This section looks at how the tools were used in participants' explorations. It identifies which tools were used in what way, what was frustrating about the tools, and what other tools visitors wanted. This part of the study gives some indications of how we may improve the tools should we choose to support similar tool-based noticing activities in the future.

How did the tools affect the visitor experience?

The toolkit was an integral part of the participants' experience outside. Although we told all the participant groups that they did not have to use any of the tools we gave them, every group choose to use at least one tool. Therefore, it is difficult to tease apart the effect the tools had in shaping the noticing experience. Some participants, however, did comment about how having a toolkit encouraged them to notice more closely or differently:

1A-W: The tools made it feel like I'm gathering. [It] feels like a scientific interaction ... knowing I had the kit gave it a completely different experience...It was exciting to have all this stuff. It made me feel armed in ways of looking and representing

8G-M: The props helped gave me a chance to interact with things. I asked myself what I could put in the bag. Asking the question caused me to look at things to put in the bag. I started noticing things more than I would have

9C-B: I stuck it [telescoping mirror] behind branches to see a bird's nest... It's kind of cool to see what birds saw when they're learning to fly

20C-W: Even if you see something 1million times, putting it in a round dish, suddenly it's more interesting.

How did participants use these tools?

We can also say a few words about how the study participants used the tools, specifically, which tools were used for what purpose. Visitors used the tools for different purposes, most of which fall into 6 broad categories:

Collectors – tools that afford collecting samples and specimens. They include plastic bags, test tubes, tape, and petri-dishes.

Recorders – tools that afford note taking; these tools re-represent what visitors observe. They include color pencils, clay, and paper and pencil (for note taking, drawing, and making rubbings).

Amplifiers – tools that amplify and extend what can be noticed. These include flashlight, cardboard cones, magnifying glass, stethoscope, and telescoping mirrors.

Measurers – tools that measure. These include the compass, thermometer, and tape measure.

Framers – tools that frames an object and changes what can be noticed by placing the item in a different context. These include test tubes, tape on paper, and petri-dishes.

Protectors – tools that keep the user clean, such as gloves and forceps

The following table summarizes how each tool was used:

Table 4. How the tools were used

Tool	Use
Plastic bag	(Collector) Collect: termite nest, leaves, feathers, flower, seed pods, insects, litter, moss, cattail, pine needles, rock, bark
Clay	(Recorder) Make impressions: Car insignia, Wall, gravel (Recorder?) Make sculptures: feather with clay
Color Pencil	(Recorder) Draw: people, leaves
Compass	(Measurer) Determine direction: sunlight, Golden Gate Bridge, what side of the tree moss grows on
Thermometer	(Measurer) Measure temperature: Air temperature (to compare to how cold a person feels), temperature in shade and sun, temperature of mulch piles
Flashlight	(Amplifier) Shine down: hole (to look for gophers), crevices of trees, sewers
Forceps	(Protector) Get: bugs
Gloves	(Protector) Pick up: 'creepy' cocoons

	(Protector) Stick hand into compost pile to test its temperature
Cardboard cones	(Amplifier) Listen and segregate sounds: Road noise, people noise, wind
Magnet	(Amplifier) Drag through dirt (to compare composition of different dirt)
Magnifying glass	(Amplifier) Look at: cocoon, insects, flowers and parts, leaves, composted vs. non-composted leaves (?) Burn: leaves, and hand
Paper and pencil	(Recorder) Take notes (Recorder) Draw: trees and people (Recorder) Make labels for the samples collected (Recorder) Make rubbings: plaque, rocks, leaves, grates, tree trunks, asphalt, fence, bark, columns at PFA
Petri-dish	(Framer) Frame: leaves, small metal object, flora from ocean, pebble, seaweed, pine leaf 20C-W: Even if I see it a million times, putting it in a round dish, suddenly it's more interesting (Collector) Collect: flowers, plants, cocoon, bugs
Stethoscope	(Amplifier) Listen to: car engines, dumpsters, lamppost, highway traffic, vibrations in trees, building, people walking, insects walking
Tape	(?) Tape people together (Collector) Collect: leaves, sap (to compare different colors), seeds, mold, moss, cobweb, feathers, sand/dirt, building paint, litter (Framer) Framing: hair, plant 4A-M: When I put it on a white card the colors really stood out. The colors are much more distinct. I think in the abstract of the white card, things looked more interesting than they did on the plant ... when on white card it looks.. nature stands out
Tape measure	(Measurer) Measure: wall opening, fence
Telescoping mirror	(Amplifier) Look at: gaps between columns, under a bush, on top of statues, into drains, up to a bird's nest, into sewers 9C-B: It's kind of cools to see what birds saw when they're learning to fly
Test tube	(Collector) Collect: seeds, berries, flowers, moss, feathers, pine

	<p>needles, rocks, dirt, mud, water samples</p> <p>(Framer) Framer: organisms in water</p> <p>8G-M: I saw lots of stuff. Especially in the water sample I took from a puddle. You can see lots of things in the test tube that I couldn't see in the puddle. Look! There's little livestock swimming around in there</p>
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What difficulties did participants have with the different tools?

Visitors mentioned difficulties using the following tools. These findings may be useful in developing better tools for noticing outdoors.

Plastic Bags

- Plastic bags encouraged people to collect samples, which would harm the environment. This was a complaint some visitors had about this and other tools that fall into the Collector category.
- The bags were too small to accommodate some samples visitors wanted to collect

Clay

- Certain things, such as walls and leaves, did not leave an interesting impression.
- The clay did not lift cleanly and stuck in crevices.

Flashlight

- It was not really necessary since everything was well lit.

Gloves

- They weren't really necessary since visitors only picked up/touched what they would touch with their hands, or they used the forceps for the 'gross things'
- One size did not fit all. One visitor could not fit his hands into the gloves.

Petri-dish

- The lids did not stay on the petri-dish

Magnifying glass

- The magnifying glass was not powerful enough.

Tape

- The roll was too big and bulky and difficult to break off
- The tape was difficult to use (dispense)
- It did not stick too well to things.

Test tube

- The test tubes were too small to accommodate larger samples (e.g. larger rocks and fish)
- A mother was concerned that it was made of glass.
- Like the bags, one visitor mentioned that it also encouraged 'taking' from nature, which should be discouraged.

Stethoscope

- The stethoscope did not/ could not pick up sounds from many objects visitors tried, including building walls and air vents
 - The stethoscope picked up too much noise. It was too sensitive.
- Telescoping mirror
- The telescoping mirror did not have a long enough reach.
 - The mirror itself was too small.

How often were these tools used?

Table 5 gives the number of times each tool was included in the toolkit and how often it was used. The second part, *Tools participants selected*, gives some indication of which tools visitors may favor and associate with outdoor noticing.

Table 5. How often the different tools were included in the toolkit and used

Tool	Included in toolkit	Used	Usage (used / taken)
Tools included in every bag			
Bag - plastic	20	3	15%
Forceps	20	3	15%
Gloves	20	2	10%
Paper pencil	20	12	60%
Tape	20	15	75%
Tools participants selected			
Clay	3	3	100%
Color pencil	3	3	100%
Compass	4	4	100%
Flashlight	3	2	67%
Hand mirror	0	0	-
Listening cones	1	1	100%
Magnet	1	0	0%
<i>Magnifying glass</i>	15	11	73%
Petri-dish	4	3	75%
<i>Stethoscope</i>	6	3	50%
Tape measure	1	1	100%
<i>Telescoping mirror</i>	9	4	44%
<i>Test tube</i>	7	7	100%
Thermometer	0	0	-

The tools in italics indicate the top 4 most frequently chosen tools.

What other tools did participants want?

We also asked each group what other tools they would have liked to have had. This list suggests other tools we may wish to give visitors to help them explore the outside.

Table 6. Other tools participants wanted

Tools participants wanted	Number of Requests (out of 20 groups)
Acid – to analyze things in test tube	1
Analysis tools (unspecified)	1
Barometer – to measure pressure	1
Binoculars – to see things at distance	2
Bug net – to catch bugs	1
Buggy – to travel long distances in a short time	1
<i>Camera – to take pictures</i>	9
Field Guide Book – to identify plants and animals	1
Glue – put together a collage	2
Humidity measure	1
Jet pack – to fly	1
Labels – to label test tubes	1
Laser – to measure distance	1
Measuring wheel – to measure distance	1
Metal detector	1
<i>Microscope – to look at things up close</i>	6
Notebook – to better take notes	2
pH Meter	1
Pocketknife – to take samples from trees	1
Scaled drawing – to see architectural layout	1
Scissors – to take samples from trees	2
<i>Shovel – to dig through the dirt</i>	6
Snorkel – to explore the lagoon	1
Sound reading	1
Sound recording	3
Video camera	1
Wind speed measurer	1
Wings – to fly	1

The tools in italics indicate the top 3 most frequently asked for tools.

SUMMARY AND DISCUSSION

This study is a first look at what and how visitors explore and notice the outside environment. It has two main limitations: First, it was conducted at the Palace of Fine Arts, and its findings are specific to this site and may not apply to another site with a very different character. Second, the participants were drawn from Exploratorium Members who self-selected for this activity; therefore, they likely represent a more receptive and accepting portion of our more general audience. Future studies will need to draw from the broader audience population. Nonetheless, the results from this first study give us some initial indications of what visitors may notice and wonder about, how they respond to open-ended exploration, and how they use noticing tools.

What Participants Noticed

What participants noticed is highly dependent on the noticing site; therefore, the count of the number of groups that noticed a certain type of object or phenomenon will unlikely transfer to a very different location. However, the study does give us a sense of what types of things visitors might notice and what types of questions they ask about the outside environment.

We found that most of the objects that the study participants noticed and remarked upon fall into 8 broad categories: flora, fauna, rock/mineral/water, litter, people, architecture, infrastructure, and weather. At the PFA, all the visitor groups noticed something about the flora and about some aspect of the infrastructure (e.g., the roads, the traffic). Of the 8 object types, the weather was the least often mentioned (10 out of 20 groups).

We also found that participants asked the following types of questions about what they noticed:

- Identification (e.g., What is this? What is it made of? What are its parts?)
- History / Change over time (e.g., How does this change over time? What happens during different times of the year? How long does it take for this to happen? What is its history?)
- Behavior (e.g., How does it act or behave?)
- Comparison (e.g., How is this different from that?)
- Relationship between objects in ecosystem (How is this related to that? What causes that to happen?)

We may wish to think about how we might help visitors answer these types of questions about the outside in our subsequent planning and development efforts.

The Activity

Most of the participants (85%, 17 out of 20 groups) in this study felt that their time outside doing open-ending noticing and exploring was worthwhile. In fact, a majority thought that they were not given *enough* time outside and said that they easily could

have stayed outside longer. Some of explanations visitors gave for what made this activity worthwhile are listed here:

- They enjoyed spending time walking outside.
- They appreciated the chance to notice new things and to notice familiar things from a different perspective
- They enjoyed exploring on their own.
- They enjoyed using the tools
- The experience reminded them of what they used to do as children.
- They thought the area was attractive.

Again because the study participants were self-selected, the reaction may not be as positive from our broader audience. Furthermore, some of the reasons that participants gave for why this activity was worthwhile may not apply for a different location or for a different time of year. For example, close to half of the groups interviewed mentioned that they enjoyed walking outside, with a few indicating that the PFA is a particularly attractive area that “draws you in.” Participants may not feel at all the same way for a much more urban environment or during days of inclement weather.

Nonetheless, the participants’ positive experiences give us some hope for this type of activity, particularly in encouraging visitors to use tools to notice anew their outside surroundings. We can use this activity as a starting point in creating noticing activities that are interesting and relevant to the general audience as well as a research tool to further probe and understand what supports visitors need to become more aware of the world outside.

Visitors’ Concerns

This study gave us an initial glimpse at the concerns visitors may have with an open-ended noticing experience that is supported only by the simple tools we supply. To reiterate, these include:

- Safety concerns
- Feeling self-conscious
- Discomfort with the open-ended nature of the activity
- Wanting to avoid unappealing aspects of the outdoor area
- Concerns about disturbing the environment

Some of these concerns may not be as strongly tied to the location (e.g., discomfort with open-ended activities, feeling self-conscious, and environmental concerns). Therefore, we can begin to experiment with different versions of noticing activities to for example, find a structure that both supports visitors open noticing while giving them enough guidance so they don’t feel disoriented. Likewise, we can alter the tools we give visitors to discourage, or at least not enable, activities that negatively impact the environment; for example, tools such as bags seem to encourage collecting specimens while tools

such as telescoping mirrors do not. Also, we can try different strategies to attenuate visitors' feeling self-conscious while exploring outside.

Alternatively, there are other concerns that may be augmented at a more challenging site. These include concerns about the perceived safety of the areas that visitors explore and preconceptions about the appeal of a place. It is possible that with a more challenging location, most visitors may be more reluctant to venture outside, especially alone, to do this type of open-ended noticing. We will need to pay particular attention to these concerns when we relocate.

Visitors' Suggestions

This study also gave us some ideas for supplemental activities that may enhance visitors' experience. These include:

- Sharing the experience with someone else at the end of the activity
- Having explanations for what they noticed
- Identifying things outside
- Creating artwork
- Comparing what people found
- Analyzing what was collected

We can begin to experiment with different instantiations of these supplemental activities. Some of these activities can be supported inside as a follow-up activity. For example, we may wish to support visitors in creating collages from pictures they draw or take outside. Other activities can be supported while visitors are outside. For example, we can give visitors field guides so they can more readily identify the flora and fauna of the area.

Tools

This report also includes a summary of how the different tools were used, any difficulties visitors had in using each tool, and any other tools they would have wanted with them in their outdoor explorations. These data may be useful should we decide to do further research on noticing tools and/or to support noticing with similar tools.

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APPENDIX A

Date: Fri, 04 Oct 2002 10:46:50 -0700

To: (Recipient list suppressed)

From: Exploratorium Membership

Subject: Exclusive Message for Members!

Status: RO

Special Edition Membership eNews - October 4, 2002

<https://www.exploratorium.edu>

HELP SHAPE THE OUTDOOR EXPLORATORIUM

The Exploratorium is looking for Exploratorium Members to participate in a study for the Outdoor Exploratorium Project, which will develop new outdoor exhibits and activities to help people explore the outdoor environment.

During the study, we will give you some simple tools (for example, stethoscopes, magnifying glasses, and tape) for exploring the outdoors and some time to use these tools to explore the area right outside the Exploratorium. Afterwards, we'll ask you to talk with us about your experience outside. This study will take approximately one hour. Your feedback will help us plan the Outdoor Exploratorium.

We are looking for small groups (1-4 people) to take part in this study. We would like input from adult couples and groups, adults with children over 10 years old, and individuals. Each group will be given a small gift as a token of our thanks.

The first set of studies will be on the following days and times:

1. Wednesday, October 16

- a. 11:00 p.m. - 12:00 p.m.
- b. 12:30 p.m. - 1:30 p.m.
- c. 2:30 p.m. - 3:30 p.m.

2. Friday, October 18

- a. 11:00 p.m. - 12:00 p.m.
- b. 12:30 p.m. - 1:30 p.m.
- c. 2:30 p.m. - 3:30 p.m.

3. Saturday, October 19

- a. 11:00 p.m. - 12:00 p.m.
- b. 12:30 p.m. - 1:30 p.m.
- c. 2:00 p.m. - 3:00 p.m.
- d. 3:30 p.m. - 4:30 p.m.

4. Sunday, October 20

- a. 11:00 p.m. - 12:00 p.m.
- b. 12:30 p.m. - 1:30 p.m.
- c. 2:00 p.m. - 3:00 p.m.
- d. 3:30 p.m. - 4:30 p.m.

5. Wednesday, October 23

- a. 11:00 p.m. - 12:00 p.m.
- b. 12:30 p.m. - 1:30 p.m.
- c. 2:30 p.m. - 3:30 p.m.
- d. 4:00 p.m. - 5:00 p.m.

6. Saturday, October 26

- a. 11:00 p.m. - 12:30 p.m.
- b. 12:30 p.m. - 1:30 p.m.
- c. 2:00 p.m. - 3:00 p.m.
- d. 3:30 p.m. - 4:30 p.m.

If you are interested in participating, please send an email to

██████████@exploratorium.edu

with the following information:

- Your top 3 choices for the day and time slots when you are available (for example, 1a, 3c, 3d). Please include ONLY those times that you can attend.
- Number of people in your group and their ages
- Contact name, e-mail, and phone number

Please let us know as soon as you can so we can make the appropriate arrangements. If you have any questions about the project, feel free to send an email to ██████████@exploratorium.edu

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APPENDIX B

Project and Activity Orientation for Participants

The Outdoor Exploratorium is a new project we're just starting to work on at the Exploratorium. We hope that at the end of this project, in about 3 years time, we'll have an outdoor area with exhibits and activities for visitors. We don't have any exhibits or any planned tours or activities for visitors right now. We're really at the very beginning stages of this project.

One of the things we do at the Exploratorium before we build any exhibit and before we plan any activities is we talk with visitors such as yourselves to help us figure out what to do. So, in this project, we're trying to figure out what interests you about the outdoors and what you would like to do. This is a very important part of our creative process.

Instead of just talking about the outdoors today, we would like you to spend some time outside. We'd like you to spend about 35 minutes outside exploring or noticing the area right outside the Exploratorium and then to come back and talk to us about your experience.

Your 35 minutes outside is a time for open exploration. This means that no one will be there to tell you what to do, what to notice, what to think. You get to decide all that for yourself. We would, however, like to give you a few tools to help you explore and notice the outside.

Here is a tool bag, with:

[list stuff]

[when showing tape also show samples from other people]

You're also welcome to pick 3 additional tools from here [tool buffet]

[We are trying to see what interesting ways visitors use the tools. So, if you see a tool that seems intriguing, I would suggest that you pick it and go outside with it to see if anything comes to mind for how to use the tool]. You can use the tools in whatever way you want to explore and notice anything that interests you. Just because you choose a tool does not mean that you have to use it outside.

Also, remember that you already come with great noticing and exploring tools: your eyes, your ears, your nose, your fingers, your mind. Feel free to use those as well.

So, you're free to explore and notice anything that interests you in whatever way that you find interesting. There are some things we would like you to keep in mind:

- We haven't changed anything about the outside for this study. So, please use your best judgment to stay safe.
- Try not to spend all of your time around the lagoon. Some of the most interesting things are found in what at first seem like the least interesting places.
- Come back in 35 minutes. Here is a little timer to let you know to come back here.
- Then, we can talk about your experience exploring and noticing.

APPENDIX C

Interview Questions

Where did you go?

What did you expect to find there?

What did you do there?

Which one of these [tools] did you use?

How did you use it?

Was there anything frustrating about the tool?

What did you find or notice?

Was there anything that surprised you at xxx?

I sent you out there with very little instruction, very little direction or guidance.

How did you feel about that? How did you feel about the open-ended, or unstructured, nature of this activity?

Would you have preferred more structure?

Did you stay together?

Did you feel uncomfortable at any point?

Were there things that you wanted to explore, look at, listen to, etc but couldn't?

What were they?

Were there tools you wished you had? What?

Was there anything else that you wished you had with you?

At the beginning, I showed you some stuff that other folks did with the tape. Did that influence what you did outside?

[If they collected anything]

What do you want to do with the stuff you collected?

Was that experience worthwhile?

In what way

What could have made it a more worthwhile experience?

Do you have any suggestions for how we might improve this experience that would make it more interesting or more relevant for you?

Would you have liked to have done this alone or with someone?

Who?

Why?

Pretend that when you walked back into the Exploratorium after being outside, you did not come back and talked to me about your experience. Instead you returned the toolkit and maybe left the museum or went to see some of the exhibits inside. Do you think that may have changed your outdoor experience? Do you feel that you would have done things outside differently? Do you think that experience would be more or less worthwhile?