An Evaluation of the National Museum of Natural History Discovery Room

Smithsonian Institution
Office of Policy and Analysis

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Director's Preface

This evaluation of visitors' reactions to the Discovery Room at the National Museum of Natural History shows that the staff's knowledge and understanding of visitors' learning is mature, that there are many factors that contribute to the Discovery Room's appeal and success, and that there is room for improvement.

This behavioral study is based on two research methods: survey and observation. Both methods involve considerable time and effort, the applicability of specialized skills, and dedication. I wish to thank Andrew Pekarik, Office of Policy and Analysis (OP&A) who designed this study, prepared the data, performed the analyses, and wrote this report. Amy Bolton, Mollie Oremland, Denise Whitman, and Neil Hauck from the Discovery Room administered the survey. Observations were made by Amy Bolton, Mollie Oremland, as well as by Nikoo Paydar of OP&A. Nikoo Paydar assisted Andrew Pekarik with data preparation. The report was designed by Lance Costello, OP&A.

I wish to extend a special note of appreciation to Amy Bolton, who initiated the study. She is conscious of praxis, open to innovation, and oriented toward visitor satisfaction. The visitors' reactions show that the Room is highly regarded and exceeds expectations. Hopefully it is influential in conveying the power and magic of scientific exploration and insight. I also want to thank Cristian Samper, Director of the National Museum of Natural History, for encouraging a hands-on center that is open to the public and meets the needs of children and adults.

Carole Neves
Director
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Background

An Overview of the Discovery Room

The Discovery Room in the Smithsonian's National Museum of Natural History (NMNH) is one of the first dedicated museum spaces allowing children to handle natural history specimens and engage in hands-on activities related to the natural sciences. It was founded over 30 years ago and remodeled physically and reoriented conceptually between 2002 and 2004. The main physical changes included a new "Biodiversity Wall" (focusing on animals living within 50 miles of NMNH), and more activities that involve the process of science. The main conceptual change was a shift to an emphasis on learning-related activities, such as observation and comparison.

The Discovery Room is open to the public six days a week, although the schedule differs according to season. In summer it is open from 10:30 am to 3:30 pm Tuesday through Sunday. During the rest of the year it is open from 12 noon to 2:30 pm Tuesday through Friday, and 10:30 am to 3:30 pm on Saturday and Sunday. During all open hours there are one or two docents in the Discovery Room to assist visitors. Most of these docents are volunteers, but they are supplemented by Discovery Room staff.

In its current configuration the room consists of nine areas/activities:

SHELVES

This arrangement consists of five low shelving units with objects to handle. Each cubbyhole in the bookshelf has one object held inside a plastic container. Both the container and the cubbyhole are clearly numbered and these numbers are keyed to laminated information cards that generally sit on top of the shelves along with magnifying glasses. Altogether there are 40 objects in five topic categories, one per shelf unit: Invertebrates, Vertebrates, Anthropology, Minerals and Fossils, and Local Biodiversity Wall. Side One of the laminated cards features comments from a scientist (shown in a photograph) titled "Think about it," such as "Which objects are plants? Which objects are animals or animal parts?" Side Two contains information on each object, e.g., "Oysters are animals with no backbones – they are invertebrates. Oysters filter the water they live in and take out small particles called plankton, for food."

BIODIVERSITY WALL

Over 100 mounted specimens and photos are arranged on several walls above eye-level. They include birds, reptiles, fish, mammals, amphibians, plants and insects. Spaces between them feature artificial tree branches with leaves and photographs of local nature. Directly opposite the Biodiversity Wall is a table labeled "Research Station" that includes five copies of a customized field guide to the region, 15 published field guides, six pairs of binoculars, and three standing introductory panels, encouraging visitors to apply the materials at the station to the Biodiversity Wall, such as the text titled "Secrets of the Biodiversity Wall" which includes "All the birds on the wall are real except one. Which bird is a model?"

WONDER WINDOW

This is a Plexiglas case with shelving that is built into the wall between the Discovery Room and the hallway outside. It serves in part as an invitation to the Discovery Room, but, from inside the room, its materials can be accessed for touching, but not for removal. Contents include over twenty items: shells, eggs, a mammal, bones, headdresses, fossils, rocks, a replica skull and mounted butterflies. The display includes general labels, such as, "Animal and Plant Fossils – What makes a fossil? Find out at the Fossil Lab in the Dinosaur Hall."

DISCOVERY BOXES

In a cabinet by the door are stored ten wooden boxes, each of which bears a title and a picture describing its contents. The information is given with a photograph of a scientist, a suggestion for looking, such as, "Look at the grain patterns in these rocks. Rock expert Leslie Hale wants to know, 'Which rocks do you think are igneous, sedimentary, or metamorphic?'" Inside the box are objects to touch and study, and information about them is placed on the inside of the lid. The subjects are: World Music, Patterns on Shells, Geology Rocks, Fossil Stories, Echinoderms, Skulls, Seeds, Skeletons, Bird Eggs, and Insect Survival. Some of the boxes include a magnifying glass. There is a table next to the storage cabinet where the boxes can be conveniently examined.

COLLECTION DRAWERS

Two cabinets, with six drawers each, contain specimens that cannot be touched. Each drawer is covered with a protective Plexiglas. Each item is labeled with both a common name and scientific name, and in the corner of each drawer a scientist who studies this material is introduced with a photograph or drawing and a brief question, such as "How do plants and

animals without skeletons leave fossils? Hint: What would happen to an insect if it got trapped in sticky tree sap?" The drawer topics are: Techniques and Technology, Mammals, Fishes, Anthropology, Corals, Mineral Sciences, Birds, Amphibians and Reptiles, Entomology, Echinoderms, Botany, and Paleobiology. A magnifying glass is generally available on top of one of the cabinets.

CLOTHING CORNER

Seven items of small-sized clothing (mostly dresses) and four pairs of shoes, representing different cultures, are available in the corner of the room, along with a full-length wide mirror, a map of the world, a question card "Where is your family from?" and a list of the countries whose clothing is represented here.

MICROSCOPE

A binocular microscope with a light stands on a small table along with some samples to examine, including six plastic boxes holding butterflies and six seashells.

READING CORNER

A reading alcove features two book racks with about 40 picture books on topics such as plants, animals, rocks, and anthropology. A large beanbag chair and the carpeted steps provide seating.

LARGE OBJECTS

Around the edge of the room are placed a variety of large objects: two large specimens of petrified wood, a globe, an African shield, a large clamshell, a mounted alligator head, a whale rib and a grizzly bear skull. Labels are identifiers only, such as "Grizzly Bear."

Origin and aims of these studies

The manager of the Discovery Room, Amy Bolton, requested this evaluation in order to better understand who was visiting the Discovery Room, what activities they were engaging, and whether the newly redone facility was accomplishing its goals of stimulating learning-related behaviors. The Office of Policy and Analysis (OP&A) worked closely with the staff of the Discovery Room to work out a plan that would meet the aims of the study. Two separate studies were designed: a visitor survey, and an observation study. It was decided to conduct these studies primarily in the summer season, when museum attendance reaches its highest level and the Discovery Room is open more hours.

Methods

Visitor Survey

Between June 13 and July 16, 2006, each visitor group leaving the Discovery Room was asked to participate in the survey by completing a questionnaire. A random selection process identified the individual within the group whose opinion was solicited for the questions rating the Discovery Room and how it compared to expectation. (Individuals under the age of four were considered ineligible for the study.) The other questions – entrance and exit times, whether this was a first visit, age, gender, whom the selected individual was visiting with, where s/he lives, and how s/he knew about the Discovery Room – could be answered either by the individual alone, or, if the respondent was very young, by an older person in the group working together with the selected individual.

The response rate was exceptionally high – 97% of those asked completed questionnaires. Altogether 504 questionnaires were completed. The visit groups of these 504 individuals included a total of 2,122 visitors.[1]

1 Due to the size of the survey sample, the 95% confidence interval is 4%, i.e., there is only a 5% chance that a frequency of 50% in the survey data would be greater than 54% or less than 46% in the complete population. In other words, percents in the middle range are ±4%.

Observation Study

Between August 4 and October 18, 2006, visitors were observed in the Discovery Room. A strict protocol was followed to ensure that the subjects for observation were randomly chosen. All visitors between the ages of 3 and 15 were eligible for the study. Observers noted the age and gender of the selected individuals (age was estimated in many cases), the size and composition of the visit group, time in the Discovery Room, and activities in the Discovery Room. Activities included: which of the areas the subject stopped at; whether or not s/he was led there, and, if so, by whom; what tool(s) s/he used at that location (magnifying glass, binoculars, microscope, or text); what learning-related behaviors were observed at that location (describing, identifying, comparing, reading, asking, answering, explaining); and who else participated in those behaviors (accompanying adult, docent, or child). Altogether 100 visitors were observed.[2]

2 For the observation sample the 95% confidence interval is 10%, i.e., there is only a 5% chance that a frequency of 50% in the observation data would be greater than 60% or less than 40% in the complete population. In other words percents in the middle range are ±10%.

Table 1a-1: Age			
(Survey, in percent)			
"How old are you?" and "Please Record the Ages of youth/ children"			
Age	**%**	**Age**	**%**
0 to 3	7	18 to 24	3
4 to 6	13	25 to 29	4
7 to 9	15	30 to 34	10
10 to 12	10	35 to 39	18
13 to 15	4	40 to 44	8
16 to 17	1	45 and over	7
		Total %	**100**
		Number of visitors	*2122*
		Mean	**Median**
All visitors		22.5	16
Under 18		7.6	7
18 and over		37.8	37

Table 1a-2 Estimated Age	
(Observation, in number of observed visitors)	
Age	**N**
3	2
4	12
5	8
6	12
7	13
8	14
9	13
10	8
11	6
12	4
13	3
14	2
Total #	**97**
	Mean **Median**
Under 16	7.6 8

Table 1a-3: Sex				
(Survey, in percent)				
"What gender are you?"				
	%		**% Male**	**% Female**
Male	34	Under age 18	40	60
Female	66	Age 18 and over	28	72
Total %	**100**			
Number of respondents 500				

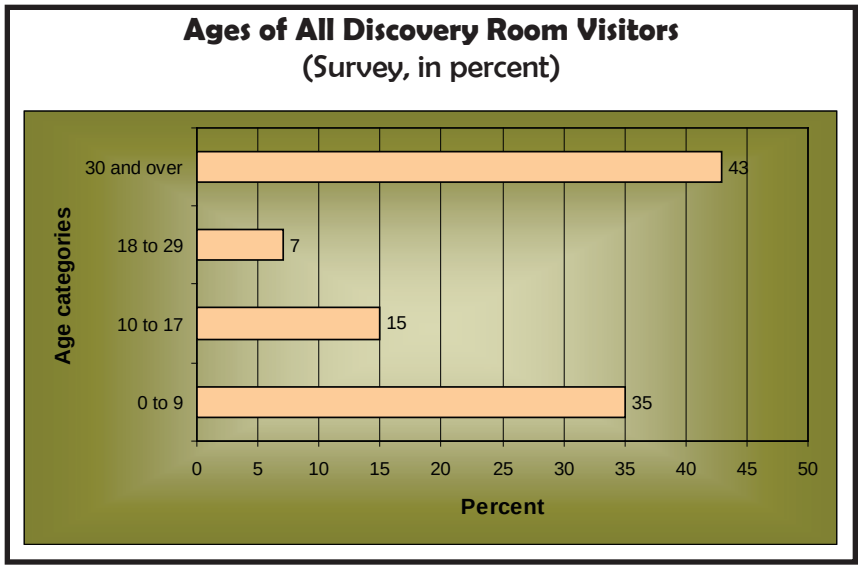
Table 1a-4: Sex	
(Observation, in number of observed visitors)	
Male	53
Female	47
Total #	**100**

1. Profile of Visitors

1a. Age and Sex

The average age for visitors under age 18 is eight years of age. However, only seven percent of all visitors are under age 4; 5 percent are between ages 13 and 17. The average age of the adults in the Discovery Room is 38.

Females are more numerous than males, both among the children (60% female) and among the adults (72% female).[3]



3 The observation sample includes a higher percentage of males (53%), but this is probably due to the selection rule, which called for the observer to select the first visitor under 16 who enters the room once the observer is positioned and ready to begin. Boys may be more likely to be at the head of their group than girls.

Table 1b-1: Residence by Region	
(Survey, in percent)	
"Where do you live?"	
	%
Metro Washington Area	15
Southeast	28
Mid-Atlantic	16
Midwest	7
New England	2
Mountain Plains	6
West	7
Unspecified U.S.	13
Other Country	6
Total %	**100**
Number of respondents	*500*

Table 1b-2: Knowledge of the Discovery Room	
(Survey, in percent)	
"How did you know about the Discovery Room?" [Choose one or more]	
	%
Saw it	73
Heard about it	12
Been here before	12
Internet	3
Total %	**100**
Number of respondents	*493*

Table 1b-3: First Visit	
(Survey, in percent)	
"Is this your first visit to this Discovery Room?"	
	%
First visit	87
Repeat visit	13
Total %	**100**
Number of respondents	*498*

1b. Residence

One in seven visit groups (15%) was from the Washington DC Metropolitan Area. This reflects the large numbers of tourists in the museum's summer audience. Half of the visit groups were from more than 250 miles away. Only about one quarter of the audience knew about the Discovery Room before they actually saw it, and nine out of ten visitors were visiting the Discovery Room for the first time.

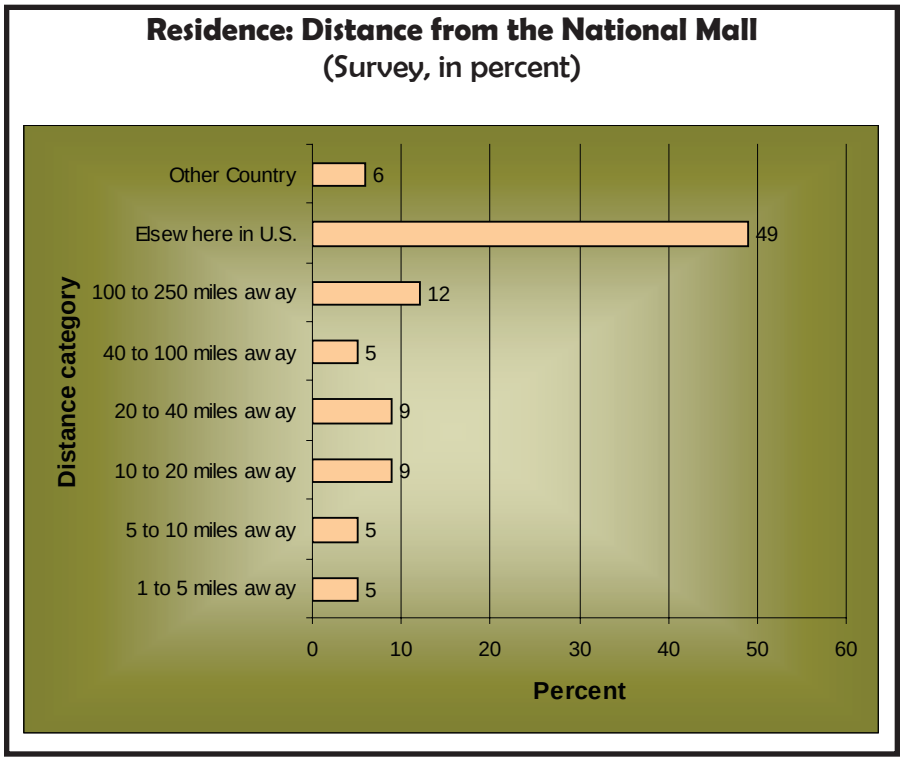


Table 1c-1: Visit Group Type	
(Survey, in percent)	
"Who are you here with today?" [Choose one or more]	
	%
I am alone	0
School group	6
Organized group	6
One other adult (over 18)	33
Several adults	51
Youth/child(ren) under 18	85
Number of respondents	*504*
	Mean
School group size	9.6
Organized group size	8.5
Other group size	5

Table 1c-2: Visit Group Structure	
(Survey, in percent)	
"Who are you here with today?" [Choose one or more]	
	%
Groups with adults only	0
Groups without adults	3
Mixed groups	97
Total %	**100**
Number of respondents	*504*

Table 1c-3: Visit Group Size	
(Survey, in percent)	
"Who are you here with today?" [Choose one or more]	
	%
Two visitors	11
Three visitors	18
Four visitors	17
Five visitors	18
Six visitors	9
Seven visitors	7
Eight visitors	5
Nine visitors	3
Ten or more visitors	12
Total %	**100**
Number of respondents	*504*
	Mean
All visit groups	5.5

Table 1c-4: Social Group	
(Observation, in number of observed visitors)	
	N
Family	96
School	4
Total #	**100**

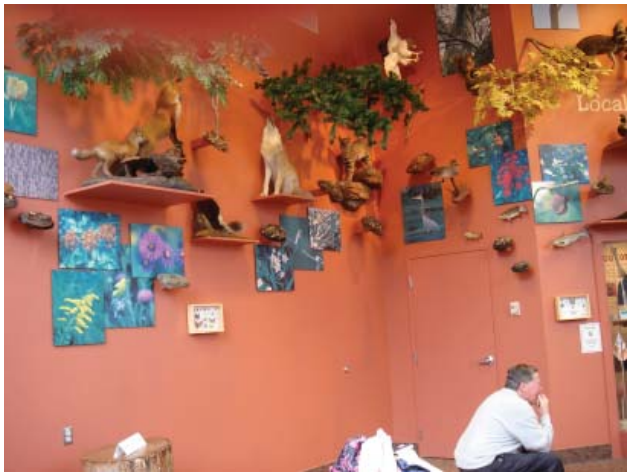
Table 1c-5: Children with each Child Observed	
(Observation, in number of observed visitors)	
Children	**N**
0	30
1	40
2	17
3	7
4	3
5	2
6	1
Total #	**100**

Table 1c-6: Visit Group Size	
(Observation, in number of visit groups)	
Size	**N**
2	23
3	24
4	24
5	14
6	8
7	2
8	5
Total #	**100**

Table 1c-7: Adults with each Child Observed	
(Observation, in number of observed visitors)	
Adults	**N**
0	2
1	49
2	38
3	8
4	2
5	0
6	1
Total #	**100**

1c. Visit Group

Discovery Room visitors come in groups, with an average size of five people. None of the survey respondents had come alone. School groups and organized groups are larger, with averages of ten and nine members, respectively. The typical visit group (accounting for 59% of all visitors) is comprised of one or two adults with one or two children. Three percent of the visitors are teenagers with other teenagers or younger children, but without an accompanying adult.



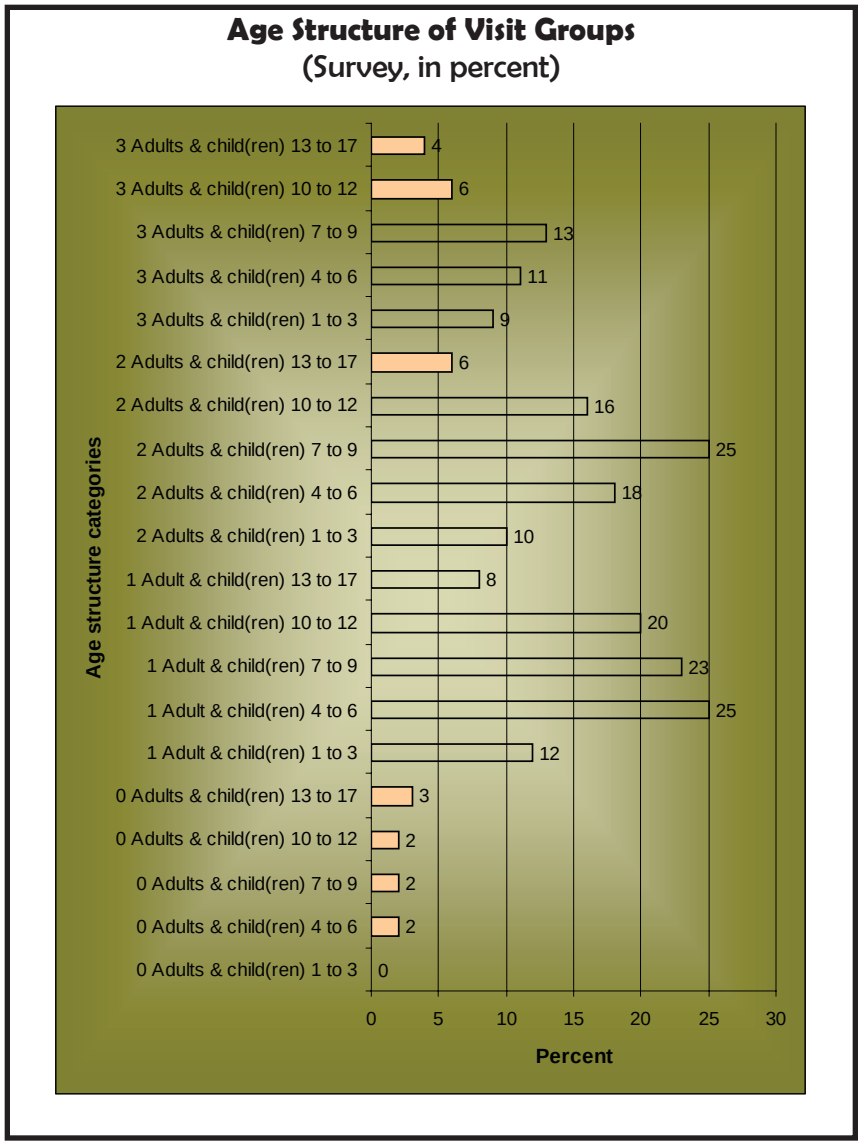
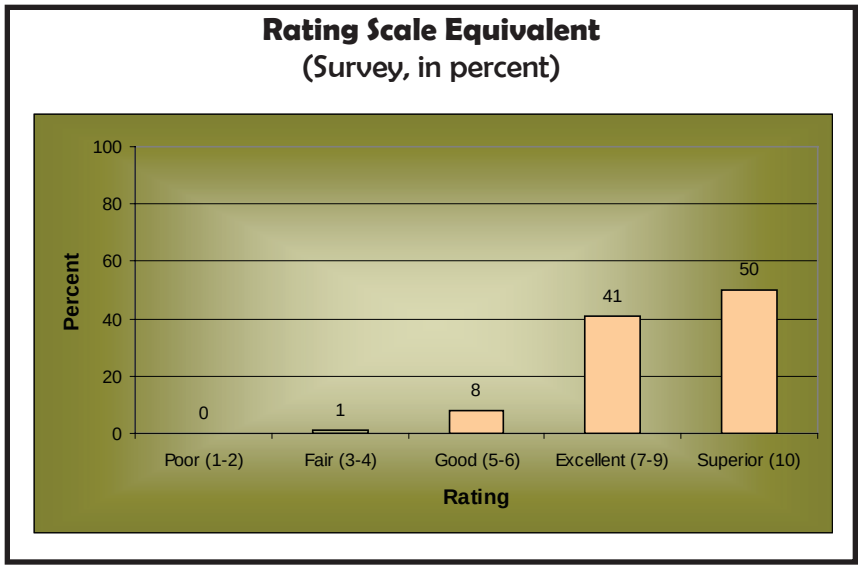


Table 2-1: Rating of the Discovery Room	
(Survey, in percent)	
"How much did you like the Discovery Room today?"	
	%
10 ("Loved it")	50
9	15
8	18
7	8
6 ("It's o.k.")	5
5	3
4	1
3	0
2	0
1 ("Didn't like it")	0
Total %	**100**
Number of respondents	*497*
	Mean
All visitors	8.8
Under age 18	8.7
Age 18 and over	8.9

Table 2-2: Comparison to Expectation	
(Survey, in percent)	
"How did your visit to the Discovery Room compare to what you expected?"	
	%
It was better	29
It was what I expected	17
It was not as good	2
I had no expectation	52
Total %	**100**
Number of respondents	*503*

2. Rating of the Discovery Room

Visitors were asked in the survey to score how much they liked the Discovery Room. The ratings were very high, with half of the visitors selecting the highest point on the scale.



The scale had ten points with three anchor points: one – "Didn't like it"; five or six: "It's o.k."; and ten "Loved it." Interestingly ratings were not related to age. There was no statistically significant difference between the ratings given by children and the ratings given by adults.

About half of the visitors (47%) admitted to having some expectations for the room when they entered, and for the majority of those with expectations (60%), it was better than they expected. One in twenty of them (5%) felt that it was not as good as they expected.

Table 3a-1: Time in the Discovery Room	
(Survey, in percent)	
[Mark] "Time in" "Time out"	
	%
Less than 15 minutes	30
15 to 20 minutes	43
More than 20 minutes	27
Total %	**100**
Number of respondents	*497*
Mean	**Minutes**
All visitors	21.8
Under age 18	21
Age 18 and over	20.5

Table 3a-2: Time in the Discovery Room

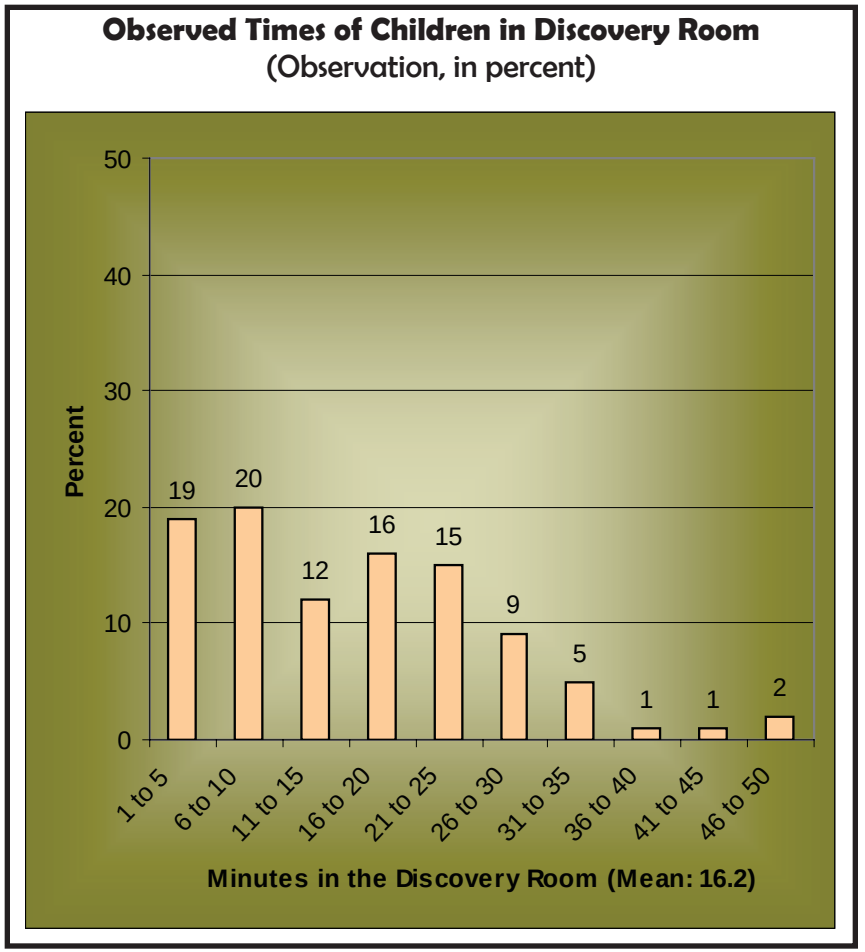
(Observation, in number of observed visitors)

Minutes	N		Minutes	N		Minutes	N
1	3		14	2		27	2
2	1		15	2		28	1
3	2		16	5		29	1
4	8		17	2		30	2
5	5		18	2		32	1
6	1		19	4		34	2
7	3		20	3		35	2
8	3		21	5		40	1
9	6		22	2		42	1
10	7		23	3		46	1
11	1		24	2		49	1
12	4		25	3		**Total #**	**100**
13	3		26	3		**Mean**	**16.2**

3. Behavior in the Discovery Room

3a. Time

On average visitors spent about 15 to 20 minutes in the Discovery Room. Survey visitors were asked to estimate the time they entered and to record the time they left the room. The average time was 22 minutes. According to the survey half of the visitors stayed less than 15 minutes and one third stayed longer than 20 minutes. The average stay among observed visitors was 16 minutes, and the maximum stay in the observation study was 50 minutes.[4] In the observation study the average length of stay did not differ with the month, i.e., on average, visits in August were as long as visits in September or October.



4 One individual in the survey study reported a visit of over 4 hours. The next longest reported time was one hour and twenty minutes.

Table 3b-1: Led to at least one location	
(Observation, in number of observed visitors)	
	N
By an adult	54
By a docent	11
By a child	8
By none of these	41

Table 3b-2: Age of child and Led to a stop by an adult			
(Observation, in percent)			
Age	**Number of times the observed visitor was led to a stop during the visit**		
	0	**1+**	**Total %**
Under age 8	35	65	100
Age 8 and over	58	42	100
All visitors	47	53	100

Table 3b-3: Number of Locations Led to by Others			
(Observation, in percent)			
Number of Locations	**Number of times others led to stops**		
	Adult	**Docent**	**Other Child**
0 Locations	46	89	92
1 Locations	27	9	6
2 Locations	9	2	1
3 Locations	9	0	1
4 Locations	6	0	0
5 Locations	2	0	0
6 Locations	1	0	0

3b. Movement

Children were quite active within the room. On average, they moved to a different area of the room eight times during their visit. **Many children found their way around the Discovery Room completely on their own. Over half of the children (54%) were led to at least one location by an adult.** Children moved freely throughout the room, often returning to locations multiple times. Observers noted if a child was directed from one location to another, and, if so, whether they were led by an adult, a docent, or another child. Docents and other children did not lead many children to any of the Discovery Room locations (11% were led to at least one stop by a docent, and 8% were led by another child). Adults in visit groups were more likely to lead younger children to a new location (adults led 65% of children under 8 to at least one location, and 42% of children ages 8 or over). And half of the children who were led to new locations by adults were only led once. Adults were much more likely to lead a child in October (78%) than in August (44%). Docents were also much more likely to lead a child in October (44%) than in August (5%).

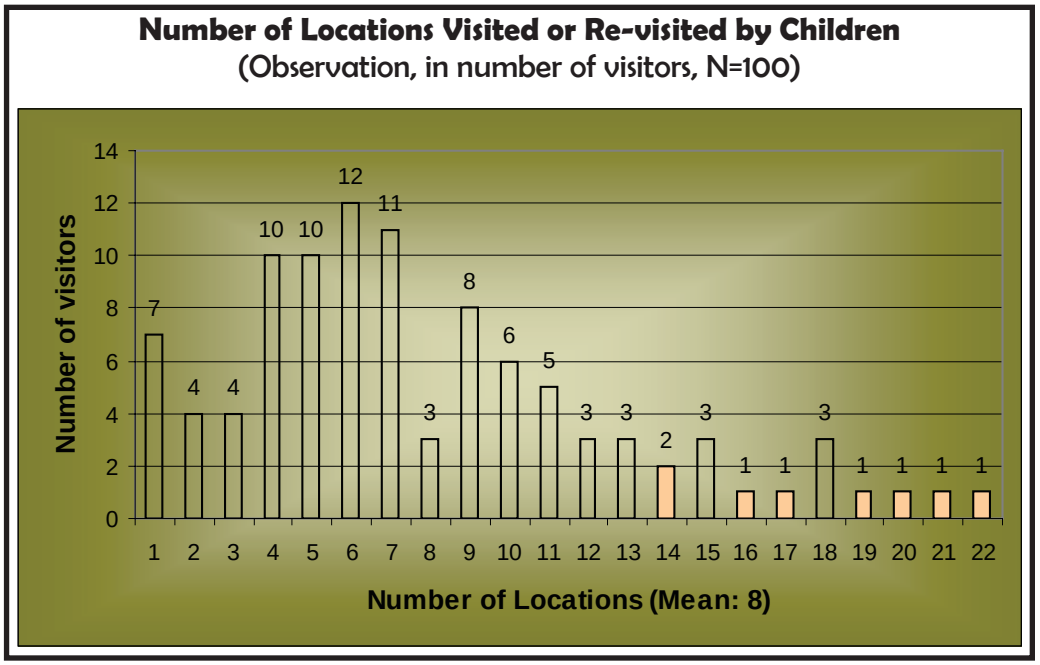
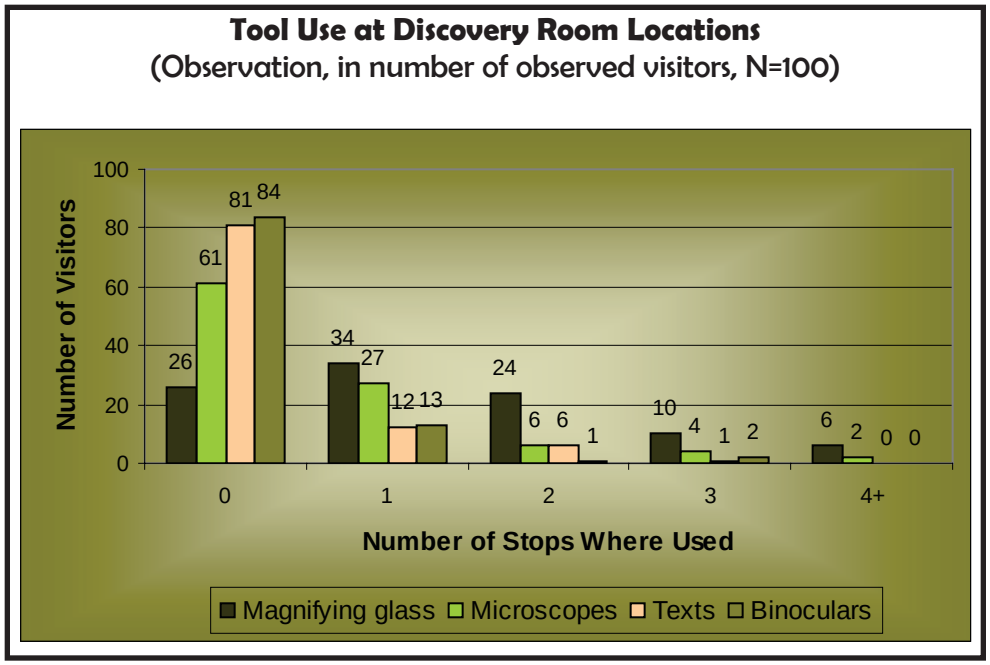


Table 3c-1: Stops at Discovery Room Locations and Tool Use								
(Observation, in number of observed visitors, N=100)								
Where Visitors Stopped (at least once)	**How many of them**	**Who led them there (at least once)**			**What tools they used there (at least once)**			
	Observed Visitors	**Led by Adult**	**Led by Docent**	**Led by Child**	**Used Magnifying Glass**	**Used Binoculars**	**Used Microscope**	**Used Text**
Shelves	91	29	4	3	47	1	0	3
Discovery Boxes	64	16	4	2	32	1	1	0
Collection Drawers	64	18	1	2	17	0	0	0
Microscope	63	6	2	0	4	1	37	1
Wonder Window	57	7	0	0	5	0	0	0
Large Objects	55	9	0	2	11	2	0	0
Clothing Corner	36	6	0	2	0	1	0	0
Reading Corner	35	1	0	0	1	0	0	15
Biodiversity Wall	29	1	6	0	3	11	0	3

3c. Tool Use

Generally seven large magnifying glasses are available for visitor use. They are kept on top of the shelves. The room has one stereo microscope, and five sets of binoculars (intended for viewing the Biodiversity Wall). In addition there are short, laminated identification texts throughout the Discovery Room, especially with the Shelves and the Discovery Boxes.



The magnifying glasses were used most often. Three out of four children used a magnifying glass at least once during their visit, and two out of five used the microscope. By contrast one in five used binoculars or a text, and most of those who used binoculars or texts used them only at one location. Although the magnifying glasses were "stored" on top of the shelves, children used them throughout the room (except at the Clothing Corner location).

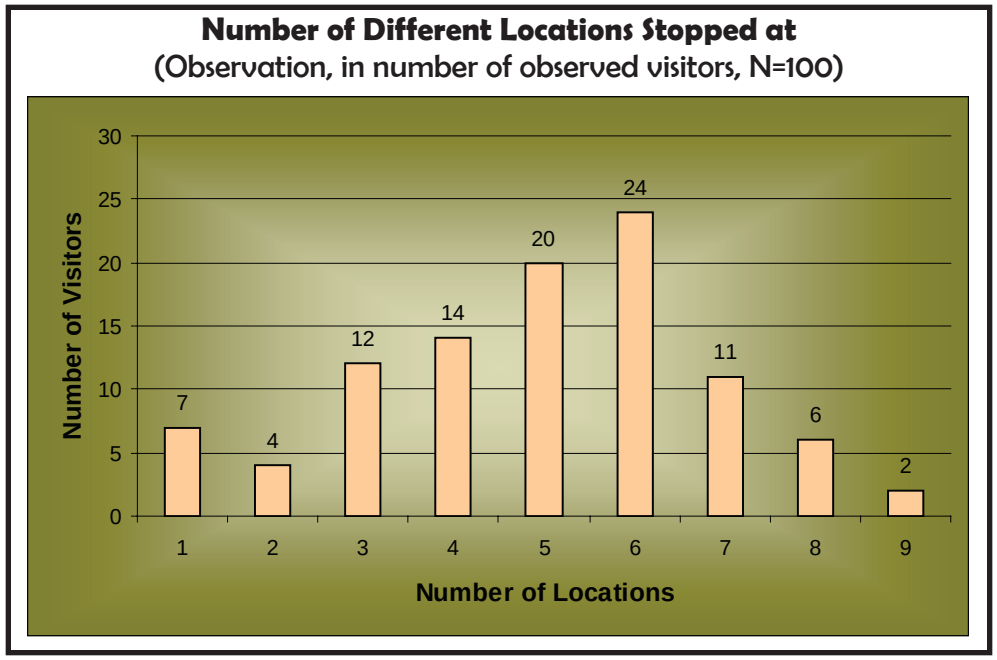
One in ten children trained their binoculars on the Biodiversity Wall at least once. And almost no child read text except in the Reading Corner location. The microscope was a self-contained activity. Only one child brought an object from a box to the microscope for closer viewing.

Table 3d-1: Number of Times Visitors Stopped at a Location						
(Observation, in number of observed visitors, N=100)						
Location	**Number of times the visitor stopped there**					
	0	**1**	**2**	**3**	**4+**	**Mean**
Shelves	9	35	25	14	17	2.1
Discovery Boxes	36	43	17	2	2	0.9
Collection Drawers	36	43	18	2	1	0.9
Microscope	37	37	17	5	4	1.1
Wonder Wall	43	41	13	3	0	0.8
Large Objects	45	37	7	9	2	0.9
Clothing Corner	64	28	5	2	1	0.5
Reading Corner	65	28	6	1	0	0.4
Biodiversity Wall	71	17	7	4	1	0.5

3d. Locations

The Shelves were by far the most popular location. Nine out of ten children (91%) stopped there at least once, and one in three children (31%) returned to the shelves two or more times after going elsewhere. The next most popular locations were the Discovery Boxes, Collection Drawers, and Microscope. Nearly two out of three children stopped at each of these at least once (63-64%). They were closely followed by the Wonder Window and Large Objects, each with approximately three out of five visitors (55-57%). The Clothing Corner location was visited by one in three visitors (36%), and girls were twice as likely to visit as boys (50% vs. 25%). The least-visited location was the Biodiversity Wall, where somewhat more than one in four children (29%) spent some time focused on a part of the wall.[5]

There was quite a bit of movement between locations. On average children visited five of the eight locations, visiting some of them more than once. There was no difference in activity among the three months of the observation study – in all three months, August, September and October, the average number of different locations visited and average number of total locations visited was the same.



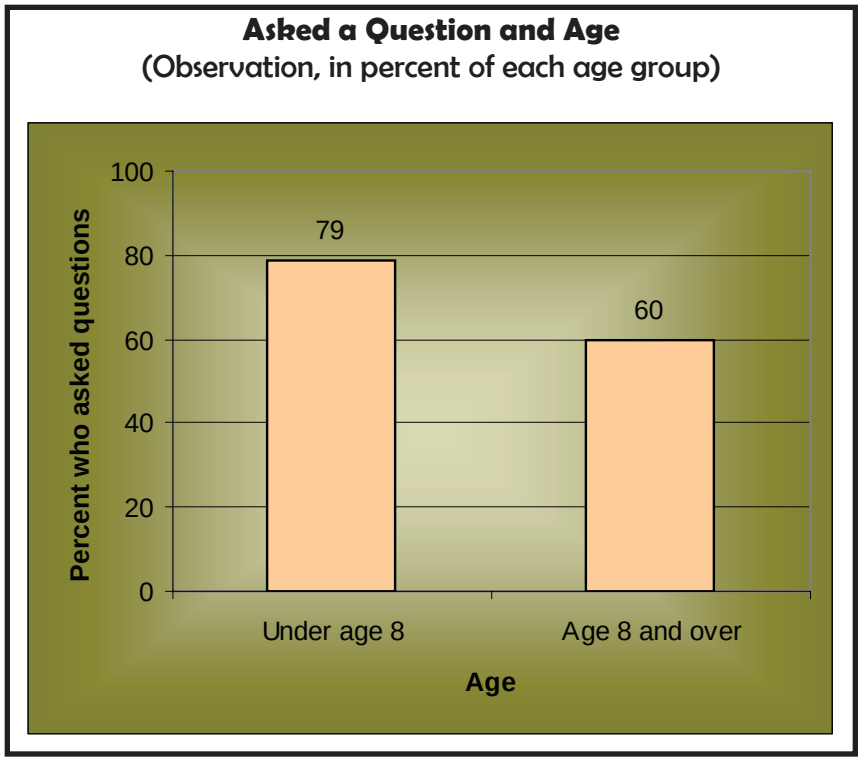
Children were much less likely to stop at the Wonder Window in October (28%) than in August (63%) or September (65%).

5 A stop at the Biodiversity Wall means that the child paid close attention to something on the wall display. Thus a Biodiversity Wall stop could take place anywhere in the room, and does not imply that the child necessarily stood directly in front of the wall.

Table 3e-1: Learning-Related Activities at Each Location								
(Obsevation, in percent of those who stopped at that location)								
Location	**Behavior (at least once)**							
	Identified	**Asked**	**Answered**	**Described**	**Read**	**Explained**	**Compared**	**None of these**
Shelves	50	48	40	37	22	20	9	6
Discovery Boxes	48	48	38	25	23	20	14	5
Collection Drawers	39	31	13	20	17	8	8	5
Large Objects	31	15	7	22	9	6	6	6
Biodiversity Wall	31	14	17	21	10	7	3	7
Wonder Wall	19	12	5	11	5	5	2	5
Clothing Corner	14	17	11	17	3	8	3	3
Microscope	10	21	18	25	5	8	0	6
Reading Corner	9	9	6	14	40	6	0	0

3e. Learning-related Activities

The intention of the Discovery Room is to encourage children to engage in learning-related behaviors with relation to the natural world and different cultures. For the purposes of this study seven behaviors were singled out for observation: identifying, comparing, reading, asking, answering, explaining, and describing. Prior research in learning in museum settings established that four of these behaviors were found to be statistically related to increases in learning, and hence could serve as performance indicators for learning: asking a question, answering a question, commenting on or explaining an exhibit, and reading the text.[6] The three other behaviors that were part of the observation protocol—identifying, comparing, and describing—were considered particularly appropriate to the activities of the Discovery Room. None of these activities differed by sex or group size, but asking was more common among those under the age of eight than among those age eight or over.



6 Borun, M.; Chambers, M.; Dritsas, J.; and Johnson, J. (1997). "Enhancing Family Learning Through Exhibits." *Curator* 40/4: 279-295, p. 280. See also: Borun, M.; Chambers, M.; and Cleghorn, A. (1996). "Families Are Learning in Science Museums." *Curator* 39.2: 123-138. Borun, M., and Dritsas, J. (1997). "Developing Family-Friendly Exhibits." *Curator* 40/3: 178-196.

Table 3e-2: Number of Stops Where Visitors Engaged in Learning-Related Activities							
(Observation, in number of observed visitors, N=100)							
Activity	**Number of stops where the visitor was observed doing this**						
	0	**1**	**2**	**3**	**4**	**5+**	**Mean**
Identified	24	33	18	8	10	7	1.7
Asked	30	24	26	8	7	5	1.6
Answered	39	36	14	3	5	3	1.1
Described	39	24	18	10	6	3	1.3
Read	54	26	12	3	4	1	0.8
Explained	61	26	9	2	1	1	0.6
Compared	78	14	6	1	1	0	1.1

Identifying and Asking

Identifying and asking were the learning-related behaviors that were noted most often.[7] Three out of four children (74%) were observed identifying an object at least once during their visit, and around the same number (70%) were overheard to be asking a question at least once. The Shelves, Discovery Boxes and Collection Drawers were the principal locations where these activities took place. Roughly half of the children who stopped at the shelves identified or asked about something there (50% and 40% respectively); one half of those at the Discovery Boxes identified or asked (48% and 48%); and one third at the Collection Drawers (39% and 31%). A substantial percentage of children who stopped at the Large Objects (31%) and Biodiversity Wall (31%) were also identifying, but fewer were asking questions with respect to those locations (15% and 14%, respectively).

7 It should be noted that the tabulation of these learning-related activities is not as accurate as the recording of other behaviors, such as locations stopped at or tools used. In order to tell what the child was saying to an adult, docent, or other child, the observer had to get fairly close to the child while also not alerting the visit group to the fact that one of their members was the subject of study. While a sign was posted at the entrance to the Discovery Room during observation periods stating that observers were at work, observers took pains to ensure that the subjects they were focusing on would not be aware that they were the ones being watched.

Describing and Answering

Three out of five children (61%) were observed to have described an object or answered a question at least once during their visit. Those who stopped at the Shelves were most likely to have described or answered (38% described; 40% answered). Those who stopped at the Discovery Boxes were similarly likely to have answered (38%), but less likely to have described (25%).

Reading and Explaining

Overall roughly two out of five children were observed to be reading (46%) or explaining (39%). Reading was most common among children who stopped at the Reading Corner (40%). A child who stopped at the shelves or the Discovery Boxes was about equally likely to be observed reading or explaining at least once at those locations (around 20%). Very little explaining was noted at any other location.

Comparing

About one in five children (22%) were observed comparing. Comparisons were most common at the Discovery Boxes (14%). Very little comparing was observed among visitors at any of the other stops.

Table 3f-1: Number of Stops Where the Partner was Involved																
(Observation, in number of observed visitors, N=100)																
Partner	**Number of stops where the partner was involved**															
	0	**1**	**2**	**3**	**4**	**5**	**6**	**8**	**9**	**10**	**11**	**12**	**13**	**19**	**22**	**Mean**
Adult	11	15	12	15	11	8	9	4	0	7	1	1	3	0	1	4.2
Docent	51	16	8	8	8	4	2	1	1	0	0	0	1	0	0	1.5
Child	46	10	8	10	4	5	3	6	4	2	0	0	1	1	0	2.4

Table 3f-2: Partner engagement at Locations			
(Observation, in percent of those who stopped at that location)			
Location	**Partner for the learning-related activity**		
	Adult	**Docent**	**Child**
Discovery Boxes	70	28	34
Shelves	68	24	30
Collection Drawers	58	9	31
Microscope	56	8	38
Clothing Corner	42	11	25
Large Objects	40	9	13
Biodiversity Wall	38	14	21
Wonder Wall	37	7	19
Reading Corner	29	0	14

3f. Partners for Learning-related Activities

The seven learning-related activities were facilitated primarily by adult members of the visit group. Adult engagement levels were especially high at the Shelves, Discovery Boxes, Collection Drawers, and Microscope (68%, 70%, 58% and 56% respectively). The lowest levels of adult engagement were at Reading Corner (29%). Engagement with docents was most likely at the Shelves and the Discovery Boxes (24% and 28%), and to a lesser extent at the Biodiversity Wall and the Clothing Corner (14% and 11%). Engagement with other children in learning-related activities was most likely at the Microscope (38%) and at the Discovery Boxes, Collection Drawers, and Shelves (34%, 31%, and 30%). Only a few children (6%) were not engaged with anyone else during their visit.

Overall, nearly all children (89%) were engaged with an adult at least once during the visit, and about half with a docent or another child (49% and 54%). Docents and other children were very likely to be engaged with children in October (94% for each) compared to August (37% for docents and 47% for children).

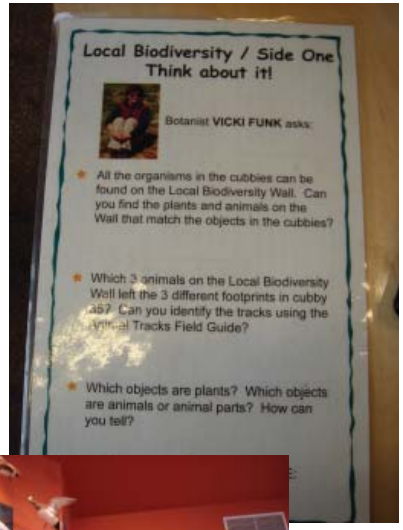
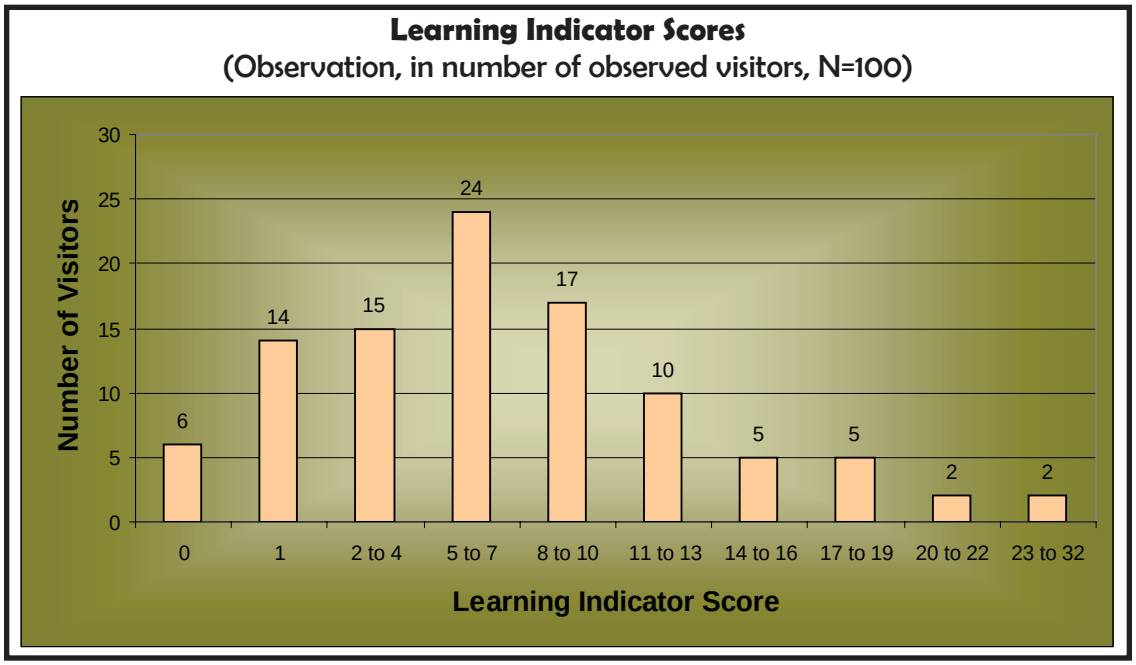


Table 3g-1: Factors Significantly Associated with Higher Learning Indicator Scores					
(Observation, in percent of observed visitors sharing a particular factor)					
Factor	**Learning Indicator**				
	0	**1 to 4**	**5 to 8**	**9+**	**Total %**
7-9 different locations	0	5	26	68	99
4-6 different locations	7	24	40	29	100
1-3 different locations	9	61	26	4	100
Over 20 minutes	0	12	27	61	100
10-20 minutes	0	17	57	26	100
Under 10 minutes	19	59	16	6	100
Led by an adult	2	17	43	39	101
Never led by an adult	11	44	24	22	101
Used a magnifier	3	24	37	37	101
Never used a magnifier	15	42	27	15	99

3g. Learning Indicator

Since the activities observed here are associated with learning, we can assume that the more activities an individual engaged in, and the more locations where these activities took place, the greater the likelihood of learning. Accordingly the Learning Indicator is a sum of all the learning-related activities recorded for an individual at all of the locations that person visited within the Discovery Room.



The values for this measure range from 0 through 32, with an average of 7. In other words, **on average each child was observed engaging in learning-related activities on seven occasions.**[8] Only six percent of children were not observed engaging in any of the seven learning-related activities at one or more locations in the Discovery Room. The average did not vary across the three months: August, September and October.

Four factors were closely associated with higher scores on the Learning Indicator: the number of different locations visited, time in the Discovery Room, being led to at least one location by an adult, and using a magnifying glass.

8 The actual number of instances of these activities is higher than the observation data reflects, because the observers made a record of the learning-related activity only once for each location. Thus a visitor who comes to the shelves and asks about five items and another who comes and asks about one item would both be recorded as having asked a question during that stop at the shelves without distinguishing how many questions they asked.

Discussion

The survey study indicates that the Discovery Room is serving families well. It is extremely well-liked, with half of the visitors on average giving it the highest possible rating. This is the second-highest score that OP&A has recorded in the last three years.[9] Since adults rate the Discovery Room as highly as children do, this score indicates that the exhibition is working for the family as a whole.

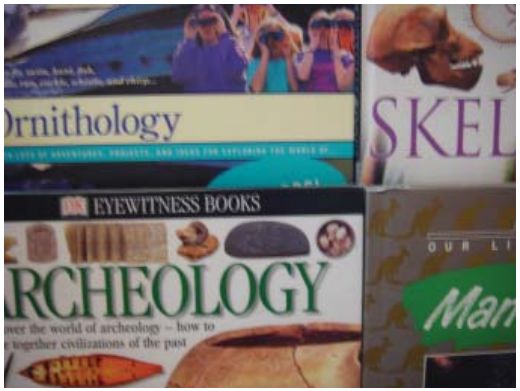
In part this high rating can be attributed to the fact that the Discovery Room visitors do not wander in accidentally but have made a deliberate decision to enter and devote the time, based on their estimation that the room will prove interesting. In other words, the score reflects the good judgment of the visitors who choose to enter as well as the sense that the room was even better than they expected.

Somewhat surprisingly, there were few observed differences between visits in August, when the Discovery Room is often crowded with visitors, and October, when visitors are far fewer and docents are much more involved in the average visit. Average visit length, number of stops, number of different stops, and learning-related activities did not vary by

9 Only the 2006 Hokusai exhibition at the Arthur M. Sackler Gallery scored higher, with 52% of visitors rating it in the top category.

month. This suggests that the interests of the individual family group are a more important factor in how the room is used than the degree of crowding. This, in turn, implies that the current room set-up is well-suited to different levels of overall activity.

The observation study suggests that the learning-related goals of the Discovery Room staff are being met to a significant degree. Only about one in 17 children (6%) pass through the Discovery Room without exhibiting at least one learning-related behavior, and on average at least seven learning-related behaviors were observed for each child.



At the same time, there are some learning-related behaviors that are infrequent. None of the current activities is adequately encouraging comparing behaviors. The percentage of visitors who were observed to be comparing was less than ten percent at all of the locations except the Discovery Boxes (where 14% were comparing). While it is possible that comparing might be occurring in ways that are more difficult to recognize, it also seems likely that comparing is a more sophisticated behavior than identifying, describing, asking, or answering. Comparing might require a set-up that more directly encourages it. For example, samples for the microscope could be provided in boxed pairs, so that visitors could easily shift from one thing to another that contrasts with it in some interesting or suggestive way. In the present study not a single case of comparing was observed at the microscope.

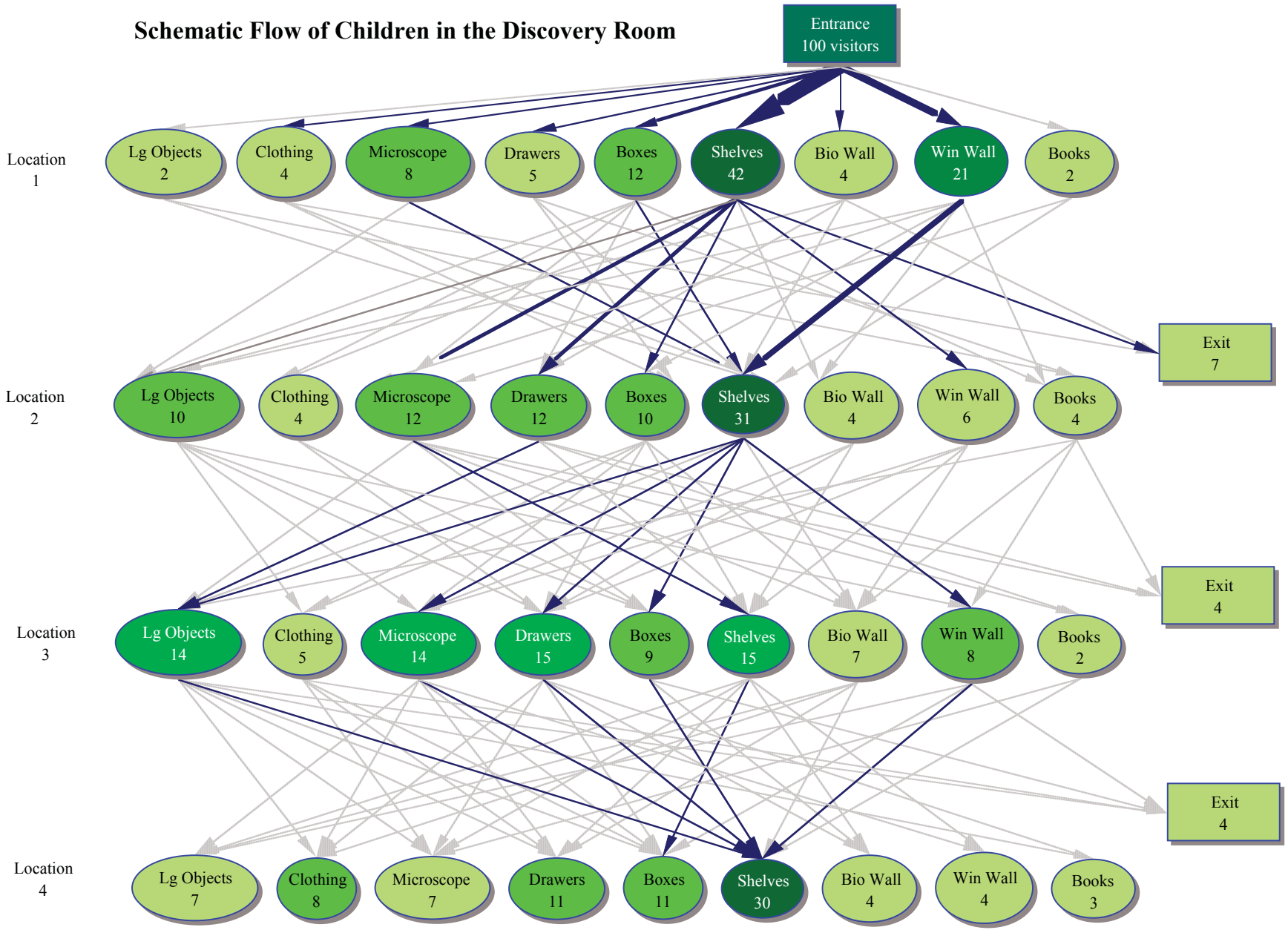
Although the introduction of the Biodiversity Wall was considered a major feature of the renovation, it seems – from the point of view of learning-related behaviors – not to be particularly effective. It is the least attended to of all the locations (presumably because it is literally over the heads of most visitors). The extent of learning-related behaviors at the Biodiversity Wall is nearly identical to that of the Large Objects. This suggests that the Wall is being used by visitors in the same way that the large objects are. Its dedicated educational apparatus (binoculars, texts, field guides, etc.) do not seem to be having much impact, primarily because they are not heavily used. While nearly one in three children who focus on the Biodiversity Wall use binoculars (38%), only one in ten of them (10%) makes use of the texts.

If the Biodiversity Wall is to work better for visitors, both the display itself and the materials that are aimed at it (presently the binoculars and texts) would need to be significantly revised. Some possible changes might include incorporating sound, visitor-controlled spotlights, or digital materials (e.g., crittercam videos, animal tracking simulations, provocative questions, etc.) into the presentation, or making existing materials more visible and attractive.

The low percentages for learning-related behaviors are more reasonable at the Clothing Corner, where the main activity is trying things on (since there is no explicit link between the clothes and different cultures), and at the Wonder Window (which primarily functions as a display window for the hallway and has signs discouraging interactivity). The Clothing Corner location, in particular, could benefit from improvement. Since children who put on clothes frequently displayed their new appearance to adults, information or graphics directed at the adults could make this more effective. For example, colorful tags attached to the back of each apparel item could cleverly introduce some aspect of the lives of children who wear clothes like this. At the very least, the Clothing Corner could include photographs on the map, or labeled dolls wearing clothes like these. One observer overheard adults radically mis-identifying the cultures represented by the clothing.

The Microscope location could benefit from enlargement and enhancement. During the observations, visitors were often seen waiting in line at the microscope. The Microscope location was no less popular than the Discovery Boxes and Collection Drawers, even though the instrument itself was much harder to access and the location was less prominent. If one or more additional microscopes were added they would be used more. This is the only item in the room that can be accessed by only one child at a time. In addition, many of those who got a chance to look through the microscope had some difficulty seeing through it, either because of difficulty adjusting the lens to the proper distance or the imperfect functioning of the lamp. More child-friendly microscopes, such as the Wentz Easy-View Microscope or a CCD microscope, for example, would make it much easier for younger visitors to use the instrument effectively and for family groups to enjoy it together, thus significantly increasing learning-related behaviors at this location.

Schematic Flow of Children in the Discovery Room



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