Early Childhood Education Hall and Tech Hall Swap
A Research Report

Prepared for

by
OMSI Evaluation & Visitor Studies Division
Portland, Oregon
Contact: Marcie Benne, Ph.D.

ECE/Tech Hall Swap
Report of visitor research
June 2003

Executive Summary

Primary Results

Traffic observations

IMPORTANT NOTE: These observations were made when average daily visitation to the exhibits was 1432 people. This average is fairly representative of visitation for the past year (see Appendix B).

Stair, escalator, and elevator use

- The elevator was the most common means of traveling between floors for children in strollers.

- An average of eight groups per hour boarded the elevator from the first floor while an average of 12 groups per hour boarded from the second floor. The average load size was three people. About 33% of the elevator users were children under eight. Travel plus wait time for the elevator averaged about 50 seconds.

- An average of four people used the stairs each minute. About 25% of the stair users were children under eight. Travel time on the stairs was about 25 seconds.

- An average of three people used the escalator each minute. About 25% of the escalator users were children under eight. Travel time on the escalators was about 35 seconds.

Restroom and nursing room use by ECE visitors

- The average number of visits to the *Discovery Space* restrooms was 14 per hour (the average number of visitors in *Discovery Space* at any moment was 39 people).

- The average number of visits to the Turbine Hall restrooms by *Busytown* patrons was six per hour (the average number of visitors in *Busytown* at any moment was 30 people).

- About 30% of the *Discovery Space* and *Busytown* groups using the restroom were mixed gender groups.

- The nursing room was never used during observation periods.

Visitor opinions

IMPORTANT NOTE: This report includes only the opinions of frequent visitors. Frequent visitors are those that had been to OMSI four or more times prior to the day of their interview.

Restroom convenience concerned just over half of ECE survey respondents.

- Just over half of the frequent visitors surveyed (51%) said they would be less comfortable if they had to use the restrooms on the second floor as they are currently designed. One percent (2%) said they would come less often.

- Just over half (52%) said that it was important or very important for OMSI to provide a family restroom.

Natural daylight concerned over one third of the ECE survey respondents.

- Over one third of the frequent visitors surveyed (36%) said they would be less comfortable if the new ECE exhibit space had less natural daylight or a reduced view of the outdoors. Another 4% said they would come less often.

Second floor ingress or egress concerned over one quarter of the ECE survey respondents.

- One quarter of the frequent visitors surveyed (25%) said they would be less comfortable if the ECE area were moved to the second floor and another 6% said they would come less often because of this.

- 17% said they would be less comfortable because emergency evacuation of the ECE area would require the use of stairs and 2% said they would come less often because of this.

- About 35% of the ECE visitors said they would access the second floor by the elevator.

An age-exclusive exhibit for "infants through seven-year-olds and the adults that bring them" was acceptable to almost all the ECE survey respondents.

- Almost all of the frequent visitors surveyed (91%) said an age-exclusive exhibit was not a problem for them.

Recommendations for future research

- Project the volume of traffic on stairs, escalators, and elevators if the swap were to occur. This will require additional data collection.

- Project the volume of traffic in the second floor restrooms if the swap were to occur. This will require additional data collection.

- Track the number of children seven and under that enter the museum and the ECE areas (through admissions and marketing surveys).

Full Report

Introduction

The purpose of this research was to gather visitor information that would help inform whether or not to switch OMSI's ECE exhibit areas with the Technology exhibit area. As part of the switch, ECE visitors would have more exhibits and more space to enjoy. However, the switch would also entail some changes that ECE visitors might not enjoy—changes involving restroom convenience, natural lighting, and second floor ingress and egress. For a description of the current ECE and Technology areas, refer to Appendix A.

The objectives for this research were to:

1. Learn more about stair and escalator use in the museum.
2. Learn more about elevator use in the museum.
3. Learn more about restroom and nursing room use by ECE visitors.
4. Learn more about visitor opinions on issues like restroom convenience, natural lighting, and second floor ingress and egress.

The four studies conducted as part of this research included:

1. An observational study of stair and escalator use.
2. An observational study of elevator use.
3. An observational study of restroom use by *Discovery Space* and *Busytown* visitors.
4. A survey of *Discovery Space* and *Busytown* visitors.

The sections of this report include:

1. Methods.
2. Results.
3. Summary of results.
4. Recommendations for further research.

Methods

This research included four different studies of the ECE experience. Those four studies were: 1) an observational study of stair and escalator use, 2) an observational study of elevator use, 3) an observational study of restroom use by *Discovery Space* and *Busytown* visitors, and 4) a survey of *Discovery Space* and *Busytown* visitors. The methods for these studies follow.

Dates and times for data collection
Data for all studies were collected on seven weekdays and four weekend days from June 6 through June 27, 2003. Data were collected across a sample of times between 10:00 a.m. and 3:00 p.m. (Table 1).

Daily museum exhibit volume on data collection days
The number of visitors that entered the exhibit areas was recorded for each of the days that data was collected. This number included the number of members entering the exhibit areas and the number of general admission tickets by individuals and groups (OMNIMAX, Planetarium, Submarine ticket sales were excluded). These numbers are in Table 1.

Visitor surveys were conducted on days with daily visitation from 925 through 2350 (average daily visitation was 1454). Observations of stairs, escalator, elevator, and restrooms were made on days with daily visitation from 1002 to 2350 (average daily visitation was 1432).

This data collection period was fairly typical compared to the prior year. That is, all but one month in the past year had an average daily visitation between 1000 and 1999 (Appendix B, Figure 11). And 167 days out of 319 (52%) had a daily visitation between 1000 and 1999 (Appendix B, Figure 12).

Table 1. Dates, daily visitor volumes, and times when each data collection activity occurred.

	Fri 6/6	Tues 6/10	Thur 6/12	Sat 6/14	Sun 6/15	Tues 6/17	Wed 6/18	Sat 6/21	Sun 6/22	Thur 6/26	Fri 6/27
Daily museum exhibit visitor volume	1631	1681	1025	1163	1002	925	1112	2350	1855	1124	1376
10–11 a.m.	SEE	VS	SEE	RR	VS			CUMSE	VS		CUMSE
11–Noon	RR	SEE VS	VS	SEE VS	RR VS		RR	RR	SEE		
Noon–1 p.m.	SEE	RR	VS	SEE VS	SEE	VS	CUMSE	VS			CUMSE
1–2 p.m.	VS	SEE	RR	RR	RR			RR	RR	CUMSE	
2–3 p.m.	RR	RR	SEE	SEE	VS		CUMSE	CUMSE VS	VS		

SEE = Stair, escalator, elevator observations
CUMSE = Cumulative stair, escalator, elevator observations
RR = Restrooms
VS = Visitor Surveys
Weekend days

The visitation level on data collection days has implications for the studies in this research that looked at escalator, stair, elevators, and restroom use. That is, the number of people that use these spaces is related to the number of people in the museum. In order to understand how these numbers change with increases in museum traffic, further studies must be conducted during times of heavier museum volume.

Methods for Study One: Escalator and front staircase use.

Study One was an observational study on how the escalator and front staircase were used (Figure 1). Of particular interest was how small children and their families used the escalator and the stairs. The study also provided a glimpse of the traffic volume on the escalators and front stairs.

Observations followed two different methods—the snapshot method and the cumulative method—which are described below. The observations for the escalator and stairs were all made separately and all data is analyzed separately. No observations were made of the back stairs.

Figure 1. Visitors were observed using the front staircase and escalator.

Method A: Counting visitors within a moment ("snapshot")

Unit of analysis and measures (identical for stairs and escalator)

The unit of analysis for this procedure was "space within a moment in time." The measures collected were:

1. Total number of people present on the stairs or escalator.
2. Number of children under 8 years old walking independently.
3. Number of children under 8 years old carried by an adult.
4. Number of strollers present.
5. Number of problems that occurred (e.g., tripping, falling, jumping, moving wrong way, running, being scared).

Procedure

Observers counted the number of visitors and staff present on the escalator and front staircase at any given moment using visual "snapshots." That is, an observer would count the number of people on the stairs at the start of the first minute, then count the number of people on the escalator at the start of the second minute. The observer would continue in this manner, alternating between the stairs and escalator, for 30 minutes. Within each snapshot, the observer would record the following measures: 1) the total number of individuals, 2) the number of children under age 8 who were walking on their own, 3) the number of children under age 8 who were being carried, 4) the number of strollers present, and 5) any problems observed. Individuals entering the space after the "snapshot" observation were not counted. The way this method worked, after each snapshot of the stairs, no one was counted on the stairs again for 119 seconds. And, after each snapshot of the escalator, no one was counted again on the escalator for 119 seconds. See instrument in Appendix C.

Sample

Observations were made during 11 periods: five during mornings, three at midday, and three during afternoons (Table 1 on page 4). Each observation period resulted in a sample size of 15 for the stairs and a sample size of 15 for the escalator. Thus, the method yielded a total sample size of 165 for the stairs and 165 for the escalators.

Method B: Counting visitors within a minute (cumulative)

Unit of analysis and measures (identical for stairs and escalator)

The unit of analysis for this procedure was "space within a minute." The measures collected were:

1. Total number of people present on the stairs or escalator.
2. Number of children under 8 years old walking independently.
3. Number of children under 8 years old carried by an adult.
4. Number of strollers present.
5. Number of problems that occurred (e.g., tripping, falling, jumping, moving wrong way, running, being scared).

Procedure

Observers monitored and tallied the number of visitors and staff that used the escalator and front staircase during one-minute periods. The observer continued in this manner, alternating between the stairs and escalator, for 30 minutes. Within each minute, the observer would record the following measures: 1) the total number of individuals, 2) the number of children under age 8 who were walking on their own, 3) the number of children under age 8 who were being carried, 4) the number of strollers present, and 5) any problems observed. Individuals entering the space after that space's minute was

over were not counted. Thus, after each tally of the stairs, no one was counted on the stairs again for 60 seconds. And, after each tally of the escalator, no one was counted on the escalator again for 60 seconds. See instrument in Appendix C.

Sample
Observations were made during seven periods: two during mornings, two at midday, and three during afternoons (Table 1 on page 4). Every observation period resulted in a sample size of 15 for the stairs and a sample size of 15 for the escalator. Thus, the method yielded a total sample size of 105 for the stairs and 105 for the escalators.

Methods for Study Two: Elevator use

Study Two was an observational study of elevator use (Figure 2). The rationale for making these observations was to better understand how small children and their families used the elevator. This also provided a glimpse of the volume of traffic on the elevator. Observations were made from the first floor and the second floor. The data for each floor were analyzed separately.

Figure 2. The first floor access to the elevator.

Unit of analysis and measures (identical for first and second floor locations)
The unit of analysis for this procedure was "space within 15 minutes." The measures collected were:

1. Total number of elevator loads.
2. Total number of people loading the elevator.
3. The number of children under 8 years old that loaded independently.
4. The number of children under 8 years old being carried by an adult.
5. Number of strollers present.
6. Number of problems that occurred (e.g., tripping, jumping, being scared).

Procedure
The 15-minute observations were made alternately between the first and second floor. The observer recorded 1) the number of loads that occurred during each 15-minute period, 2) the total number of people within each load, 3) the number of children under age 8 who were walking on their own, 4) the number of children under age 8 not walking on their own, 5) the number of strollers present, 6) any problems observed were also noted, and 7) the time to wait for an elevator. "Wait time" began when an individual pressed the button outside the elevator and ended when the doors closed after passengers loaded. See Instrument in Appendix D.

Sample
Observations were made during 15 periods: five during mornings, three at midday, and seven during afternoons (Table 1 on page 4). Thus, the first floor had a sample size of 15 and the second floor had a sample size of 15.

Methods for Study Three: Restroom use by ECE visitors

Study Three was an observational study of restroom use from *Discovery Space* visitors and *Busytown* visitors (Figures 3 and 4). The rationale for making these observations was to better understand the frequency and group makeup of restroom visits. Observations were made from *Discovery Space* and *Busytown*. The data for each were analyzed separately.

Figure 3. The two family restrooms and one nursing room in *Discovery Space*.

Figure 4. The white doors in the center of this photo (with the silver push pads) are the two multi-stall, men's and women's restrooms nearest to *Busytown*.

Unit of analysis and measures (identical for the Discovery Space restrooms, Busytown restrooms, and nursing room)
The unit of analysis for this procedure was "space during a thirty-minute period." The measures collected were:

1. Total number of *Discovery Space* and *Busytown* groups visiting the restrooms or the nursing room.
2. Number of restroom (or nursing room) groups that were mixed gender groups.
3. Number of restroom (or nursing room) groups that left behind a child or an adult.
4. Number of restroom (or nursing room) groups that left behind their belongings.
   NOTE: Because the number of restroom and nursing room visits was dependent on the number of people in *Discovery Space* and *Busytown*, the average number of patrons present at any moment was determined for each space during each half hour period.

Procedure
Observers counted the number of visitors within *Discovery Space* and *Busytown* every ten minutes during their observation period. These four counts were used to determine the average number of patrons present at any moment in *Discovery Space* or *Busytown* during each thirty-minute observation period.

Observers recorded the following measures: 1) the number of groups from *Discovery Space* or *Busytown* that visited the respective restrooms (or nursing room) during each thirty-minute period, 2) the total number of people within the group by gender and age category (adult, child, or infant), 3) whether or not the group left a group member or some belongings behind in *Discovery Space* or *Busytown* while they visited the restroom (or nursing room), and 4) whether any problems occurred with respect to the restroom (e.g., having to wait in line or an emergency situation). The instrument used to collect this data is in Appendix E.

Sample
Observations were made over a total of 13 thirty-minute periods: five during mornings, one at midday, and seven during afternoons (Table 1 on page 4). Thus, *Discovery Space* had a total sample size of 13 and *Busytown* had a total sample size of 13.

Methods for Study Four: ECE visitor opinions

Study Four was a survey of adults in the *Discovery Space* and *Busytown*. The objective was to learn more about how visitors perceived the trade-offs involved in the potential switch such as restroom convenience, natural lighting, and second floor ingress and egress.

Unit of analysis and measures
The unit of analysis for this procedure was "individual respondents." The measures collected were:

1. Number of respondents that chose each response option on seven questions.
2. Selected ideas that visitors think need consideration.

Procedure
Interviewers approached adults within *Discovery Space* and *Busytown* and asked them if they would be willing to answer some questions. The questionnaire used for the interviews is in Appendix F.

Sample

Forty-one (41) *Discovery Space* visitors and 41 *Busytown* visitors were interviewed. Interviews took place across 15 different periods: seven during mornings, four at midday periods, and four during afternoons (Table 1 on page 4). Respondents were categorized by the frequency of their visits prior to the day of the interview. The categories were: 1) first time visitor, 2) visited 1 to 3 times prior, 3) visited 4 to 10 times prior, and 4) visited more than 10 times prior (Table 2).

Table 2. Number of survey respondents according to frequency of OMSI visits.

Category	*Discovery Space* Respondents	*Busytown* Respondents	Total Number of Respondents	Percentage of Total Respondents
First time visitor.	3	3	6	7%
Visited 1–3 times prior.	2	5	7	9%
Visited 4–10 times prior.	7	10	17	21%
Visited more than 10 times prior.	29	23	52	63%

For the purposes of this study, it seemed the frequent visitors would have the strongest and clearest feelings about the ECE space swap. It also seemed that the frequent visitors are the ones that OMSI would feel particularly committed to keeping satisfied. Thus, only responses from *frequent visitors* are reported in this study. *Frequent visitors* include respondents that visited OMSI four or more times—84% of the respondents (bold box in Table 2). Thirty-six frequent visitors were from *Discovery Space* and 33 from *Busytown*.

Results

Results of Study One: Escalator and front staircase use

Travel time
The time to ascend and descend the stairs can vary greatly, but 25 to 30 seconds seems to be a reasonable estimate. The time to ascend the escalator also varies depending on whether a person remains on one step or climbs the escalator. If a person remains on one step, it takes 35 seconds to reach the second floor by the escalator.

Traffic volume
An average of four people used the stairs each minute. An average of one person was present on the stairs within each moment. An average of three people used the escalator each minute. An average of one person was present on the escalator within each moment. These results are provided in Table 3.

Table 3. Average number of visitors observed on the stairs and escalator. Note: The average daily museum exhibit volume on data collection days was 1432.

	Average number of visitors within a minute.	Average number of visitors within a moment.
Stair	4	1
Escalator	3	1

Percentage of small children and strollers
About one-fourth of the stair and escalator users were younger than 8 years old. That is, regardless of the method used to collect the data (i.e., snapshot or cumulative) and regardless of whether watching the stairs or escalator, between 20% and 30% of the visitors were younger than 8 years old. The majority of these young visitors traveled the stairs and escalator independently. Specifically, 93% of the observed visitors younger than 8 traveled the stairs or escalator independently while 7% were carried.

Likelihood of problems
Relatively few problems were observed on the stairs and escalator. For instance, during the 210 minutes (3.5 hours) of cumulative observations, 709 people used the stairs and escalator and only 13 problems were recorded. The problems recorded were: seven visitors walked down the escalator, one was afraid on the escalator, two jumped on the stairs, and three ran on the stairs.

Strollers
Strollers were rarely used on the stairs and escalators. During the 210 minutes (3.5 hours) of cumulative observations, only three strollers were taken on the stairs and escalator. Specifically, one stroller was taken down the stairs and two were taken up the escalator.

Results of Study Two: Elevator use

Travel and wait time
The elevator trip between the first and second floors takes about 25 seconds if a person does not have to wait for the elevator to arrive. However, most visitors experience some wait time prior to boarding. Recall that according to the study method, “wait time” began the moment a visitor pushed the elevator

call button, continued while they boarded, and concluded when the elevator doors closed them in the car. Visitors' wait time ranged from 2 to 56 seconds and averaged 25 seconds. Thus, when travel time and wait time are combined, on average it takes visitors 50 seconds to travel between floors by elevator.

Traffic volume
The maximum capacity of the elevator is 3,000 pounds: however, this large number is deceptive. While it appears from this number that the elevator could hold ten 300-pound men, the elevator does not have space for even ten slender men. The Facilities Services Manager estimated that the elevator will hold about eight standing people with no strollers, six people with one stroller, or four people with two strollers.

The average number of loads varies slightly between the first and second floors. That is, more people tend to load the elevator from the second floor than from the first floor. Specifically, an average of eight groups per hour board the elevator from the first floor while an average of 12 groups per hour board from the second floor (Table 4). It is likely that more groups load the elevator from the second floor because groups can take the escalator up, but not down.

Table 4. Average number of loads by floor. Note: The average daily museum volume on data collection days was 1432.

	1st floor access	2nd floor access
Per 15 minutes	2	3
Per hour	8	12

Percentage of small children and strollers
A total of 70 loads were recorded from both floors during all observation periods. The 70 loads included 211 people for an average of 3 persons per load. Of those 211 people, 33% were children under the age of 8. While the majority of these children walked on their own, the percentage of children in strollers was higher than the percentage observed on the stairs. Specifically, 60% walked alone while 40% rode in strollers.

Likelihood of problems
No problems were recorded with elevator use.

Results of Study Three: Restroom use by ECE visitors

Discovery Space restroom traffic and behavior
The average number of group visits to the *Discovery Space* restrooms was seven every thirty minutes—14 every hour (the average number of visitors in *Discovery Space* at any moment was 39 people).

The average *Discovery Space* restroom group size was two people. About 30% of the groups were mixed-gender groups. Two percent of the restroom visits were made by children visiting the restroom without an adult. Fifteen percent of the restroom visits were made by an adult who had left a child (or

children) waiting in the *Discovery Space*. At least one third of the groups (33%) left a possession in *Discovery Space* while they visited the restroom.

Discovery Space nursing room traffic and behavior
No one used the nursing room during the 390 minutes (6.5 hours) it was observed.

Busytown restroom traffic and behavior
The average number of visits to the Turbine Hall restrooms by *Busytown* patrons was three every thirty minutes—six every hour (the average number of visitors in *Busytown* at any moment was 30 people).

The average *Busytown* restroom group size was two people. About 30% of the groups were mixed-gender groups. About 70% of the groups used the women's restroom; about 30% used the men's restroom. Five percent of the restroom visits were made by children visiting the restroom without an adult. Ten percent of the restroom visits were made by an adult who had left a child (or children) waiting in *Busytown*. Only a small percentage (7%) left a possession in *Busytown* while they visited the restroom.

Results of Study Four: ECE visitor feedback

Survey results included visitors who had been to OMSI more than four times prior to the day of the interview. Sixty-nine (69) *Discovery Space* and *Busytown* visitors were included in the analysis.

Adults were asked about the ages of the children they usually bring with them to OMSI. Ages were categorized into 1) infant to three years, 2) four to seven years, and 3) older than seven years. A small percentage (10%) of these adults brought children that were over seven years old. Almost half of the adults (46%) said they typically brought only the youngest children—infants to three-year-olds.

For most survey questions, visitors were asked to choose one of five responses regarding a trade-off. The response options were:

- Still come as often, not an issue;
- Still come as often, but less satisfied;
- Come less often;
- Stop coming; and
- Not sure.

The responses to the questions are listed below and in Table 7 on page 17. The responses suggest that the trade-offs will not cause visitors to stop coming but will cause a meaningful proportion of visitors to be less satisfied. These trade-offs require attention because, in time, decreased satisfaction could lead to decreased visitation.

Would you still come as often if the space was limited to infants through 7-year-olds and the adults that bring them? .

- 91% said they would still come as often—this was not an issue.
  - Four of these adults brought a child over 7 years old.

- 6% said they would still come as often, but they would be less comfortable or satisfied.
  - One of these adults brought a child over 7 years old.
- 1% (one person) said they would come less often.
  - This one adult brought a child over 7 years old.

Would you still come as often if the space had less natural daylight and a reduced view of the outdoors?
- 57% said they would still come as often—this was not an issue.
- 36% said they would still come as often, but they would be less comfortable or satisfied.
- 4% said they would come less often.

Would you still come as often if the space was moved to the second floor?
- 67% said they would still come as often—this was not an issue.
- 25% said they would still come as often, but they would be less comfortable or satisfied.
- 6% said they would come less often.

How would your group most likely access the second floor?
- 35% said the elevator.
- 23% said the escalator.
- 4% said the stairs.
- 17% said any of the above.

Would you still come as often if emergency evacuation of the building would require using the stairs?
- 70% said they would still come as often—this was not an issue.
- 17% said they would still come as often, but they would be less comfortable or satisfied.
- 2% said they would come less often.

Would you still come as often if the men's and women's restrooms were about 40 adult paces outside of the hall and around a corner?
- 46% said they would still come as often—this was not an issue.
- 51% said they would still come as often, but they would be less comfortable or satisfied.
- 2% said they would come less often.

How important is it that OMSI provide a family restroom (versus multi-stall, male and female restrooms)?
- 52% said it was very important.
- 17% said it was somewhat important.
- 30% said it was not at all important.

How important is it that OMSI provide a nursing room?
- 46% said it was very important to have a nursing room available.
- 23% said it was somewhat important.
- 30% said it was not at all an issue.

Analysis identified the *lowest response* that a visitor gave to any of the questions that asked about future visitation frequency. A look at the lowest response for the whole group gives an idea of the percentage of the respondents that might experience some dissatisfaction if all of these changes occurred. Only 13% of the respondents had a lowest response of "come less often." The lowest response for the majority of the respondents (64%) was "still come as often, but not as satisfied or comfortable." See Table 7 on page 16.

Table 7. Responses to the questions starting with "Would you still come as often if…"
(N = 69). If responses do not equal 100%, then the remaining percentage replied, "not sure."

Question	Responses	Percentage
…the men's and women's restrooms are about 40 adult paces outside of the hall and around a corner?	No change	46%
	Less comfortable, satisfied	51%
	Less often	2%
…the space has less natural daylight and a reduced view of the outdoors?	No change	57%
	Less comfortable, satisfied	36%
	Less often	4%
…the space is moved to the second floor?	No change	67%
	Less comfortable, satisfied	25%
	Less often	6%
…emergency evacuation of the building requires using the stairs?	No change	70%
	Less comfortable, satisfied	17%
	Less often	2%
…the space is limited to infants through 7 years old and the adults that bring them?	No change	91%
	Less comfortable, satisfied	6%
	Less often	2%
The *lowest response* given across all questions.	No change	23%
	Less comfortable, satisfied	64%
	Less often	13%

Primary Findings

Traffic observations

IMPORTANT NOTE: These observations were made when average daily visitation to the exhibits was 1432 people. This average is fairly representative of visitation for the past year (see Appendix B).

Stair, escalator, and elevator use

- The elevator was the most common means of traveling between floors for children in strollers.

- An average of eight groups per hour boarded the elevator from the first floor while an average of 12 groups per hour boarded from the second floor. The average load size was three people. About 33% of the elevator users were children under eight. Travel plus wait time for the elevator averaged about 50 seconds.

- An average of four people used the stairs each minute. About 25% of the stair users were children under eight. Travel time on the stairs was about 25 seconds.

- An average of three people used the escalator each minute. About 25% of the escalator users were children under eight. Travel time on the escalators was about 35 seconds.

Restroom and nursing room use by ECE visitors

- The average number of visits to the *Discovery Space* restrooms was 14 per hour (the average number of visitors in *Discovery Space* at any moment was 39 people).

- The average number of visits to the Turbine Hall restrooms by *Busytown* patrons was six per hour (the average number of visitors in *Busytown* at any moment was 30 people).

- About 30% of the *Discovery Space* and *Busytown* groups using the restroom were mixed gender groups.

- The nursing room was never used during observation periods.

Visitor opinions

IMPORTANT NOTE: This report includes only the opinions of frequent visitors. Frequent visitors are those that had been to OMSI four or more times prior to the day of their interview.

Restroom convenience concerned just over half of ECE survey respondents.

- Just over half of the frequent visitors surveyed (51%) said they would be less comfortable if they had to use the restrooms on the second floor as they are currently designed. One percent (2%) said they would come less often.

- Just over half (52%) said that it was important or very important for OMSI to provide a family restroom.

Natural daylight concerned over one third of the ECE survey respondents.

- Over one third of the frequent visitors surveyed (36%) said they would be less comfortable if the new ECE exhibit space had less natural daylight or a reduced view of the outdoors. Another 4% said they would come less often.

Second floor ingress or egress concerned over one quarter of the ECE survey respondents.

- One quarter of the frequent visitors surveyed (25%) said they would be less comfortable if the ECE area were moved to the second floor and another 6% said they would come less often because of this.

- 17% said they would be less comfortable because emergency evacuation of the ECE area would require the use of stairs and 2% said they would come less often because of this.

- About 35% of the ECE visitors said they would access the second floor by the elevator.

An age-exclusive exhibit for "infants through seven-year-olds and the adults that bring them" was acceptable to almost all the ECE survey respondents.

- Almost all of the frequent visitors surveyed (91%) said an age-exclusive exhibit was not a problem for them.

Recommendations for future research

- Project the volume of traffic on stairs, escalators, and elevators if the swap were to occur. This will require additional data collection.

- Project the volume of traffic in the second floor restrooms if the swap were to occur. This will require additional data collection.

- Track the number of children seven and under that enter the museum and the ECE areas (through admissions and marketing surveys).

Appendix A

Description of the Early Childhood Education (ECE) and Technology exhibit areas

ECE exhibit areas

Location

The ECE exhibits are located on the first floor of the museum in the Turbine Hall. Visitors can directly access and exit the Turbine Hall from the main lobby. It is also possible to exit the Turbine Hall, directly to the outdoors, through doors on both the north and south ends of the hall.

The Turbine Hall has exhibits beyond the ECE exhibits. For instance, it has *Space* exhibits, *Engineer It!* and the physics and chemistry labs. In addition, the mezzanine level of the Turbine Hall has light, color, and sound exhibits. The mezzanine level can be accessed from two different staircases and an elevator. A room for visitors to eat their sack lunches is attached to the north end of the Turbine Hall. The only way to access the sack lunchroom is through the Turbine Hall.

The ECE exhibits within the Turbine Hall are *Discovery Space* and *Busytown*. *Discovery Space* is located in a room within the Turbine Hall and *Busytown* is located at the north end of the Turbine Hall. Both of these exhibit areas have somewhat secure access. A glass wall with one door surrounds *Discovery Space* (Figure 5). A short wall with two access gates surrounds *Busytown* (Figure 6).

Figure 5. Notice that *Discovery Space* has limited access. It welcomes children 6 years old and younger that are accompanied by an adult and it welcomes families.

Figure 6. *Busytown* surrounded by a short wall.

Lighting
The Turbine Hall receives natural light from at least four directions—south, west, north, and through skylights. The walls and ceiling are painted white.

Restrooms
The restrooms nearest to the ECE exhibits are very close and highly visible. For *Discovery Space*, the nearest restrooms are inside the glass wall. The *Discovery Space* has two family restrooms and each has a diaper changing station. Also provided in this area is a nursing room. See Figure 7. For *Busytown*, the nearest restroom is about 10 to 30 adult paces directly outside the *Busytown* wall. These restrooms are conventional, multi-stall, men's and women's restrooms. See Figure 8. Both restrooms have a space for diaper changing.

Figure 7. The doors to the two family restrooms and one nursing room in *Discovery Space* are visible in the center of this photo on the white wall.

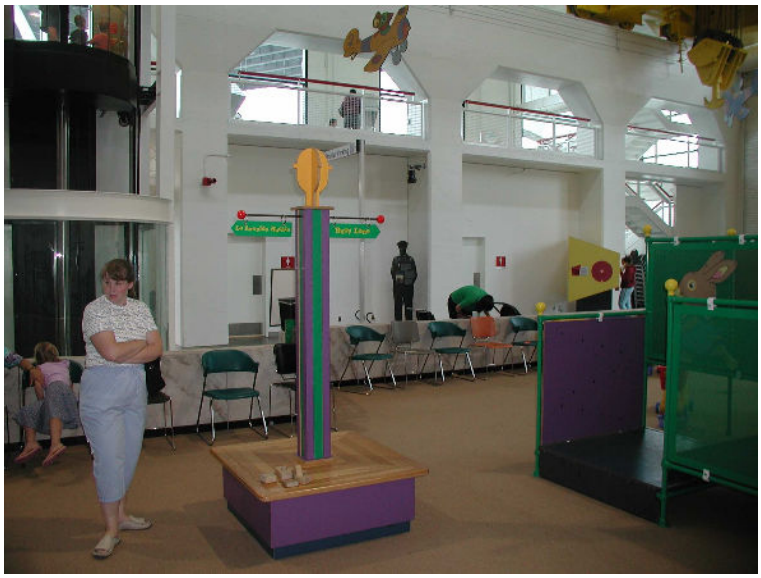

Figure 8. The white doors in the center of this photo (with the silver push pads) are the two multi-stall, men's and women's restrooms nearest to *Busytown*.

Tech Hall

Location

The Tech Hall is on the second floor of the museum (Figure 9). The hall can be accessed by an up-only escalator, two sets of stairs, or one elevator. Emergency evacuation requires use of the stairs. The hall has one entry into the main thoroughfare of the second floor and one entry into the adjacent hall to the south.

Figure 9. The Tech Hall doorway is visible on the right side of this photo. The stair on the left is one means of accessing the Tech Hall. It is also possible to take an elevator, which is visible to the right, and an escalator, which is not visible, but runs parallel to the stairs on the left.

The Tech Hall is one of three halls on that floor. The three halls are arranged in a sequence that runs from north to south. The Tech Hall has a large exhibit area, a reasonably-sized lab with water access, and two small office spaces.

Lighting

Natural daylight enters the hall through the west facing entryway only and there are no windows. The walls are currently blue and white and the ceiling is black.

Restrooms

Visitors access the restroom nearest to the Tech Hall by exiting the hall and making two right-hand turns for a total of about 40 adult paces. At that point, the restroom doors are on their right (Figure 10). These are conventional, multi-stall, men's and women's restrooms with space for diaper changing.

Figure 10. The entryway to the restrooms nearest the Tech Hall.

Appendix B

Museum daily visitation.

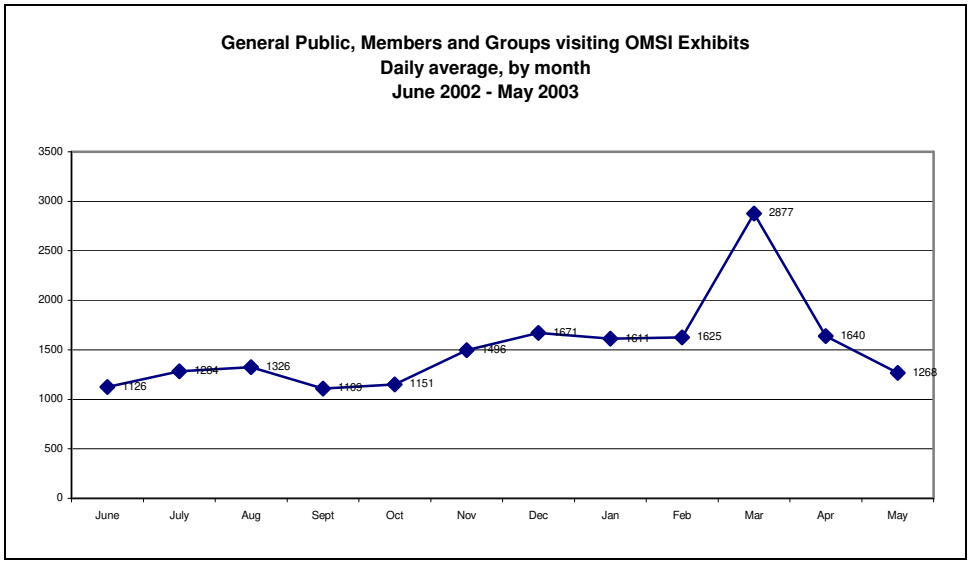

Figure 11. The daily average number of exhibit visitors for each month. These numbers do not include visitors to OMNIMAX, Planetarium, or Submarine.

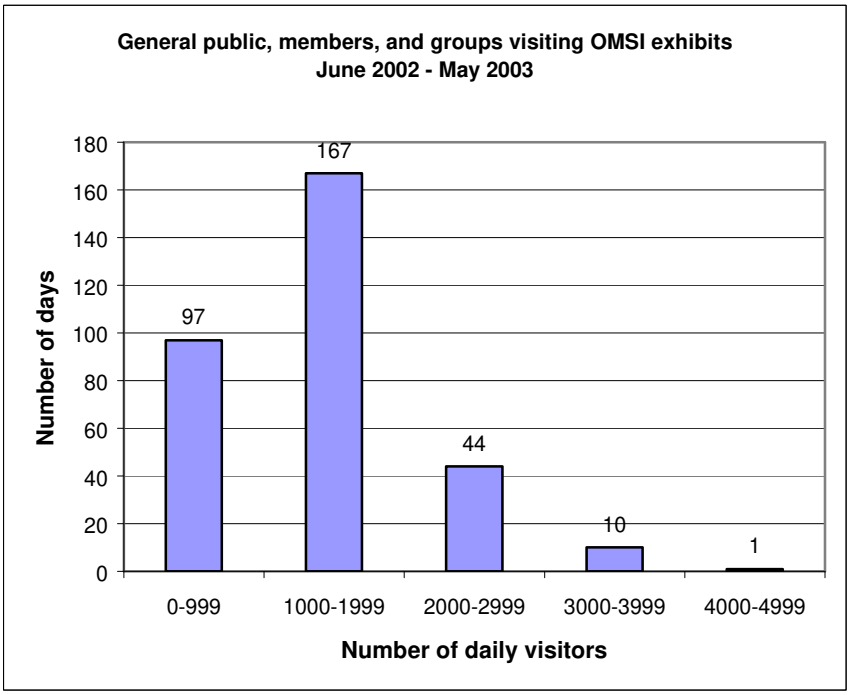

Figure 12. Number of days that OMSI had up to one, two, three, four, and five thousand visitors.

Appendix C

Escalator and front stairs observation form
This form was designed to fit 8.5 by 14 inch paper.

Start Time: _____ End Time: _____ Date: _____ Day of week: _____ Your name: _____

Snapshot method
Set your stopwatch to "beep" every 60 seconds. At the moment it beeps, immediately count the number of people in the space. You are counting people that would be in a "snapshot" taken at that moment. Do not count people that enter the space after that moment.

Cumulative method
Set your stopwatch to "beep" every 60 seconds. At the first beep, begin counting the number of people that use the escalator and the other measures indicated. At the second beep, tally these numbers and begin counting the number of people that use the stairs.

Time/space	# Total visitors	# < 8 yrs. walking	# < 8 yrs. not walking	# of strollers (carried & pushed)	Problems (e.g. fear, tripping, crowding, running, pushing, walking down escalator, getting stuck)
1:00 Escalator					
2:00 Stairs					
3:00 Escalator					
4:00 Stairs					
5:00 Escalator					
6:00 Stairs					
7:00 Escalator					
8:00 Stairs					
9:00 Escalator					
10:00 Stairs					
11:00 Escalator					
12:00 Stairs					
13:00 Escalator					
14:00 Stairs					
15:00 Escalator					

16:00 Stairs					
17:00 Escalator					
18:00 Stairs					
19:00 Escalator					
20:00 Stairs					
21:00 Escalator					
22:00 Stairs					
23:00 Escalator					
24:00 Stairs					
25:00 Escalator					
26:00 Stairs					
27:00 Escalator					
28:00 Stairs					
29:00 Escalator					
30:00 Stairs					

End Time: _____

Appendix D

Elevator observation form
This form was designed to fit 8.5 by 14 inch paper.

Date: _____ Day of week: _____ Your name: _____

Observe elevator activity from **one floor for 15 minutes**, then quickly move to the other floor and **observe another 15 minutes**.
Start the stopwatch when people push the elevator button and record the time of day. When the elevator doors open, record the number of people unloading. Then record the number of people that load onto the elevator. At the moment that the elevator doors are closed, record the time on your stop watch that represents the interval between pushing the button and moving.

Circle One: Observing First Floor Activity or Observing Second Floor Activity
Start Time: _____ End Time: _____ (Should be 15 minutes total).

	Total Unload	Total Load	# < 8 yrs. walking Load	# < 8 yrs. not walking Load	# of strollers (carried & pushed) Load	Wait Time (secs)	Problems (e.g. fear, tripping, crowding, running, pushing, getting stuck)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

Circle One: Observing First Floor Activity or Observing Second Floor Activity
Start Time: _____ End Time: _____ (Should be 15 minutes total).

	Total Unload	Total Load	# < 8 yrs. walking Load	# < 8 yrs. not walking Load	# of strollers (carried & pushed) Load	Wait Time (secs)	Problems (e.g. fear, tripping, crowding, running, pushing, getting stuck)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

End Time: _____

Appendix E

Restroom observation form

Circle One: Discovery Space or Busytown
Date: ___________ Day of the Week: ________________ Your Name: ______________
Record the number of people in the Space every 10 minutes.

Start time: _____ # visitors: _____	10 min.: _____ # visitors: _____	10 min.: _____ # visitors: _____	End time: _____ # visitors: _____

Record who entered each room (W = woman, M = man, B = boy, G = girl, I = infant).
Watch for one half hour, then switch to the other space and a new sheet of paper (Disco Space or Busytown).

Time	Who visited (M) Restroom? Comments?					Who visited (W) Nursing Room? Comments? (DS only)					Left behind while someone visited a room:	Comments (e.g. had to wait in line, seemed like an emergency, adult seemed to be juggling a lot of stuff)
	M	W	B	G	I	M	W	B	G	I	Children? Y N NS Adults? Y N NS Stuff? Y N NS	
	M	W	B	G	I	M	W	B	G	I	Children? Y N NS Adults? Y N NS Stuff? Y N NS	
	M	W	B	G	I	M	W	B	G	I	Children? Y N NS Adults? Y N NS Stuff? Y N NS	
	M	W	B	G	I	M	W	B	G	I	Children? Y N NS Adults? Y N NS Stuff? Y N NS	
	M	W	B	G	I	M	W	B	G	I	Children? Y N NS Adults? Y N NS Stuff? Y N NS	
	M	W	B	G	I	M	W	B	G	I	Children? Y N NS Adults? Y N NS Stuff? Y N NS	
	M	W	B	G	I	M	W	B	G	I	Children? Y N NS Adults? Y N NS Stuff? Y N NS	
	M	W	B	G	I	M	W	B	G	I	Children? Y N NS Adults? Y N NS Stuff? Y N NS	
	M	W	B	G	I	M	W	B	G	I	Children? Y N NS Adults? Y N NS Stuff? Y N NS	
	M	W	B	G	I	M	W	B	G	I	Children? Y N NS Adults? Y N NS Stuff? Y N NS	

If you run out of room before the thirty minutes are up, attach a new piece of paper.

Appendix F

ECE visitor questionnaire.
This form was designed to fit 8.5 by 14 inch paper.

Interview location (circle one): Discovery Space or Busytown

Time of Day: _____ Date _____ Day of Week _____ Your Name: _____

1. Prior to today, how many times have you visited this space? First time 1 -3 4 – 10 More than 10

2. What are the ages of the children that you usually bring with you? Infant to 3 4 – 7 over 7 yrs.

3. Why did you come to Discovery Space or Busytown? What attracted you to this space?
Why did you choose this space over other options in town (like Children's Museum, zoo, ???).

PROBE: What (other) words would you use to describe this space (positive, negative, functional)?

4. OMSI is thinking about expanding the space and activities we offer small children (little kids). If we build a new space it would still be very fun and attractive -- it will have also have all the exhibits we currently offer, plus more. And, young children will be more protected from larger children. But, before we make any changes, we need to find out what visitors think about this.

Given that the new space and exhibits will be just as fun – if not better, we want to know how some of the trade-offs might affect the likelihood of you returning.

NOTE: If they say they do not plan on ever coming again anyway, indicate that here and skip to #5: _____

Would you still come as often if:

a. The space was limited to infants through 7 year olds and the adults that bring them?

Still come as often - no t an issue.	Still come as often, but not as satisfying or comfortable.	Still come, but less often.	Stop coming.	Not sure.

b. The space has less natural daylight and a reduced view of the outdoors?

Still come as often - no t an issue.	Still come as often, but not as satisfying or comfortable.	Still come, but less often.	Stop coming.	Not sure.

c. The space is moved to second floor?

Still come as often - no t an issue.	Still come as often, but not as satisfying or comfortable.	Still come, but less often.	Stop coming.	Not sure.

2c1) Would your group most likely choose to access the second floor by: stairs elevator or escalator?

Would you still come as often if:

d. Emergency evacuation of the building would require using the stairs?

Still come as often - no t an issue.	Still come as often, but not as satisfying or comfortable.	Still come, but less often.	Stop coming.	Not sure.

e. The Men's and women's restrooms were be about 40 adult paces outside of the hall and around a corner?

Still come as often - no t an issue.	Still come as often, but not as satisfying or comfortable.	Still come, but less often.	Stop coming.	Not sure.

5. How important is it that OMSI provide a family restroom (versus multi-stall, Male and Female restrooms)?

Very important	Somewhat important	Not at all important

6. How important is it that OMSI offer a private nursing room?

Very important	Somewhat important	Not at all important

7. Do you have any advice for OMSI? If you were re-designing this space, --

What would you keep the same?

What would you change and improve?

What ideas would you include from other children's spaces you've visited?