Technoquest (Innovation Station) Exhibit
A Summative Evaluation Report

Prepared for

OMSI
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by

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Summative Evaluation of OMSI's Technoquest (Innovation Station)

Report prepared by: People, Places & Design Research

Summative Evaluation of
OMSI's *Technoquest* Project
(Innovation Station)

prepared by
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Executive Summary

This summative evaluation of the *Technoquest* project (the new exhibition name is *Innovation Station*) provides a thorough analysis of how visitor audiences experience this exhibition in relationship to the project's objectives. Ideally, the conclusions will facilitate the planning team's opportunity to reflect on the project's strengths and weaknesses, to consider some directions for their ongoing commitment to update and revise the exhibits, to apply any lessons here to future projects, and to contribute to general knowledge about the effectiveness of exhibitions that promote informal science education. Ultimately, the summative evaluation should help to solidify the learning experience for the entire planning team.

The development of this project took some unusual turns. At the outset, Tech Hall was an exhibit gallery and a computer lab located on the second floor in one of the least obvious areas of OMSI's public space. The process of updating and renovating this hall changed dramatically when the decision was made to relocate Tech Hall to the ground floor in the highly visible space of Turbine Hall. One of the effects of this move was that the ambiance for "tech" exhibits changed from a space with no natural light to one that was bright and spacious. At the same time, the new *Technoquest* exhibits would have to share Turbine Hall with an existing popular exhibition called *Engineer It!*–a situation that presented challenges in terms of the identity, style, and spatial arrangement of this new generation of exhibits that were being designed with a new set of goals. Since the new goals were about broad perceptions of technology, not simply seeking to communicate a body of information or to illustrate particular phenomena, blending *Technoquest* exhibits with *Engineer It!* exhibits could potentially muddle the identity and strategies for affecting people's perceptions and attitudes about technology.

The big move of the hall was not the only challenge affecting the development of this exhibition. The exhibit team wrestled with some huge goals. At the beginning of the project, the team's thinking tended to be about the term 'technology' in general and various ways in which it was misunderstood (e.g., as products rather than process) or thought to be inhibiting (i.e., less appealing to girls and women). Ultimately, however, the goals were focused on visitor experiences in ways that were consistent with informal science education. The six goals that guided this evaluation were:

◆ The exhibits should make technology personally meaningful by connecting to visitors' everyday experiences outside the museum. Visitors to *Innovation Station* will find topics to explore that they find interesting or familiar to them.

◆ The exhibits should be engaging for people of all ages and with a variety of interests and abilities. There should be activities for everyone in the family to enjoy.

⬥ The exhibits should be equally engaging for male and female visitors. Both boys and girls should find activities that they enjoy and should feel comfortable in the exhibit space.

⬥ The exhibits should provide opportunities for visitors to consider the trade-offs associated with technology. Visitors should understand that technology gives them more choices but these choices may have good and bad consequences.

⬥ Some exhibits should focus on the process of technology–encouraging visitors to engage in the process of designing, creating, or inventing something. The exhibits should empower visitors to figure something out or make something work.

⬥ The exhibit space should feel inviting and fun to visitors.

In addition to these interpretive-educational goals, OMSI's administrative representative asked reasonable questions about whether the big move to transform Turbine Hall with the new technology exhibits was worth it. Did visitors perceive a difference and, if so, was that for the better or not? These practical questions also informed the selection of methods and questions for this study.

Research Methods
This summative evaluation used a multi-method approach to investigate the experiences of children and adults, including these parts of the research strategy:
Method 1: *Exit interviews* were conducted with 358 visitor groups leaving Turbine Hall. Some questions were answered by an adult in the group while other questions were directed at both adults and children in the target age range of 8-14. The purpose of this strategy was to explore visitors' overall experience of the exhibition in terms of enjoyment, awareness of the change in Turbine Hall exhibits, feelings about the ambiance, and perceptions of interpretive messages.
Method 2: *Photoboard interviews* were conducted with 150 children (aged 8-14) as they were leaving Turbine Hall. The purpose of this strategy was to obtain more in-depth information about children's use and perceptions of selected exhibits and to explore potential gender differences.
Method 3: *Exhibit-focused interviews* were conducted with 259 adults who stopped at one of 6 exhibits selected for in-depth study. The purpose of this strategy was to get systematic data about some exhibits that the planning team felt could be problematic or ineffective in some way (not well-used, hard to use, hard to understand, fun but not educational).

Summary of Findings
Many of this project's goals and questions raised by the exhibit team were addressed by the summative evaluation. In the following summaries, the goal or challenge is stated first and then the findings are presented about visitors' experiences.

Ambiance of the Space:
Although there are no systematic data from visitors about their perceptions of the *old* Tech Hall, it was most frequently described by OMSI staff (n=12, using a staff questionnaire) as "dark," "electronic," and "outdated." One goal for the new *Technoquest* exhibits in Turbine Hall was to create a lighter, more colorful appearance and thereby signify a more whimsical and user-friendly image of technology.

The results indicate that a large majority of repeat visitors noticed a change in Turbine Hall and said it was "for the better." Visitors most often chose the words 'fun' and 'exciting' to describe the atmosphere of this hall (top two descriptors from a list of nine phrases). About half of the adults and children selected 'friendly' or 'inviting' to describe the feeling here (even though this isn't a huge proportion, it seems positive for exhibits about technology and engineering). About half of the adults (but not many children) felt that the space was 'loud' (possibly reflecting the crowds and high level of activity in this hall). Overall, then, visitors' perceptions of the ambiance of technology exhibits was clearly positive.

Broad Appeal
The exhibit team wanted to communicate with a broad audience about technology but realized that there may be gender issues involved–that technology may be less interesting to girls and women. The formative studies documented some differences between men and women in their comfort with technology (such results were correlated with occupation, with fewer women in technology-related jobs). So, the exhibit development and design process continuously focused on how the exhibits would be perceived by women and girls.

The findings very clearly show that this exhibition hall is equally appealing to women and men and to girls and boys. Both genders gave similar ratings of the overall experience, chose mostly the same words to describe the feeling of this hall, had similar patterns of use (of the sample of exhibits and areas we asked about), gave similar ratings to selected exhibits, and had similar opinions about the complexity of some exhibits. Meanwhile, the *perception* of gender differences continues to exist: girls as well as boys thought that girls in their class would be less interested in these exhibits than boys in their class.

"Doing" Technology – Engaging in the Process of Designing and Inventing
A goal of this exhibition was to broaden people's impressions and understanding of technology, with an emphasis on the process of invention and design rather than on "high-tech" products. One of the formative studies for this project suggested that people are fairly informed about the process of inventing/designing, but they don't necessarily connect these ideas with technology. Interviews with visitors in the front-end research showed that their definitions of technology tend to focus on electronic products such as computers, TVs, and cell phones.

The results show that most visitors do not come away from this exhibition with a conscious perception of technology as a main theme. However, many people do *recognize* one or more of the process-words inherent in technology, selecting the words designing, inventing, or engineering from a list of possible themes. Further supporting this perception, a majority of children felt that they had designed or invented something in this Hall. The examples they gave included both *Technoquest (Innovation Station)* and *Engineer It!* exhibits, suggesting that it was appropriate to put these exhibits together in one space as they reinforce each other. Repeat visits appear to enhance the sense of inventing and designing things, perhaps as people discover some of the less-used exhibits that round out the experience or perhaps as they move beyond basic patterns of use (figuring out how to use an exhibit) to explore how to use an exhibit differently (becoming more conscious of their options or role in creating something).

Relevance to Everyday Life
The exhibit team was initially concerned that people think technology is high-tech stuff that's mechanical, complicated, and outside of the range of everyday life. Therefore, another goal of this exhibition was to make technology personally meaningful by connecting to visitors' everyday experiences.

In their exposure to the variety of exhibits here (many of which are "low-tech"), it's clear that visitors associate technology with a wide range of everyday things. Two-thirds of the children felt that they had seen familiar things that relate to everyday life, giving examples such as computers, paper cups, airplanes, bottle rockets, toilets, bridges, balls, and light bulbs. Adults perceived some exhibits as being relevant to everyday life (Tech Choices, Oregon Inventors), while some other exhibits were not (Ball Room, Float Table, Program a Robot).

Educational Value of the Exhibits
The project team had concerns about the effectiveness of some of the new exhibits. Mini-studies of six exhibits (method 3) provide some systematic information about the educational value and visitors' understanding of the interpretive content for the following exhibits:

♦ Ball Room: Is anyone learning anything here or are people just throwing balls at each other? The findings suggest that it's some of each. About half of adults, and somewhat fewer children, were able to reasonably explain the main point of this exhibit in terms of content or principles (learning about air pressure, vacuum, designing tubes for a purpose). This activity especially conveyed the ideas that "you can play around without caring which way works better" and "there's more than one way to do things."

♦ Float Table: Do people understand this activity, or are they just having fun floating things in the air with no particular purpose? Although only about half of

the adults said they had read the labels, the vast majority of them (84%) gave a reasonable explanation of the main point of the activity. This exhibit was perceived as "encouraging creativity," "showing there's more than one way to do things," and "playing around without caring which way works better." Nearly all the adults who stopped here did participate in the activity (with their children).

♦ Program a Robot: Are people using this activity? do they like it and understand it? The results indicate that this is not a highly used exhibit: only 25% of the children recalled stopping here. The activity had moderate appeal among adults and children. However, of those who did use it, most adults (79%) had a reasonable understanding of the main point. Some people enjoyed the challenge while others got frustrated; some adults complained that the light level made it hard to see, while some children had difficulty telling left and right.

♦ Technology Choices: Are people engaged by a serious quiz-type game on a computer monitor? Do they understand that there are a lot of ways that we make choices about technology in our lives? The findings indicate that this exhibit serves a smaller proportion of the visitors (only 20% of kids interviewed said they stopped here), but among the people who did use it, the results suggest that children liked this computer "game" more than adults. The main ideas are not entirely clear–about 50% of adults got a reasonable message.

♦ Oregon Inventors Panels: Is it worthwhile to have a non-interactive exhibit that may not attract much use? Designers say that there are always requests for some type of text and graphics panels that are not interactive, and they wonder if these are worth doing. The findings do support the notion of lower use, at least among children: only 18% stopped there. However, among adults who looked at these panels, three-quarters indicated a reasonable understanding of the main point (the process of invention), and a similar proportion felt that it related to everyday life. Perhaps this is a successful supplemental exhibit in that it provides context and relevance.

♦ Build an Aqueduct: Do visitors understand this activity? Adults and children understood the point of this activity, although a substantial portion of adults suggested that it could be easier to operate or have better instructions (about 60% said they read the labels).

The Unique Challenge of the Space of Turbine Hall
The decision to blend new technology exhibits with the previous *Engineer It!* exhibits in a larger space made sense. However, the planning team worried about the huge turbine in the middle of the space – that this would be an obstacle to people's use of the entire space, seeing all the exhibits. The openness and size of the architectural space may have been a useful cue for people that there was more to see beyond the turbine, perhaps aided by the strategy of marking a pathway along the floor past the turbine. The findings indicate that most visitors did go beyond the turbine to the far end of the hall.

A. Visitors' Awareness of Change in Turbine Hall

This first section deals with the questions of whether visitors are aware of the new exhibits and renovations to this hall and whether these exhibits are attracting repeat visits. Highlights of the results are:

♦ Among people who remembered seeing the old Turbine Hall, the vast majority (86%) noticed a change, and, of those, 78% thought it was "for the better." People noticed the new elements such as the Ball Room and they also noticed that some of the old activities (*Busytown*, sand) were gone.

♦ Some families with *only* preschool-aged children (14%) did not like the changes–they missed the old *Busytown* exhibits and they thought the new exhibits were geared more toward older kids.

♦ Very few people said they came to OMSI specifically to see exhibits in Turbine Hall (more than six months after opening), but nearly 40% of *repeat visitors* said it was a factor in their decision to visit the museum. About one in five visitors had already seen the new Turbine Hall since it re-opened in November 2004 and were seeing it again on the day they were interviewed.

A.1. Familiarity with the Hall and Perceptions of Change

OVERVIEW: For 81% of the adult visitors interviewed, this was their first experience with the new Turbine Hall; about one-fifth of the visitor groups had already seen the hall on a previous visit (since November). Among repeat visitors who were seeing the new exhibition for the first time, the vast majority said they noticed a change (86%), and most of these people thought it was for the better (78%). Members were more likely than non-members to notice the change, but less likely to say it was better (because they have younger children and missed the old *Busytown* exhibits).

	(n=358 groups)
repeat OMSI visitors, seen hall recently	19%
repeat OMSI visitors, familiar with old hall (pre-Nov.)	40%
repeat OMSI visitors, unfamiliar with old hall (long ago)	23%
first-time visitors to OMSI	18%

ADULT EXIT INTERVIEWS

AMONG those who had seen the old hall before November:
Does it seem as though anything has changed here?

	Overall (n=140)	Members (n=69)		Non-member (n=69)
yes	86%	93%	**	80%
no / not sure	14%	7%		20%

(among those who noticed a change:)
Is the change for the better, for the worse, or no opinion?

	(n=120)	(n=64)		(n=54)
better	78%	75%	**	82%
worse	6%	11%		0%
neither / no opinion	16%	14%		18%

Analysis by ages of kids in the group:

		Under 6 Only (n=36)	Mixed Ages 0-17 (n=33)		Only Age 6+ (n=46)
The change is . . .	for the better	80%	82%	++	74%
	worse	14%	3%		2%
	neither / no opinion	6%	15%		24%

Asterisks (**) indicate statistically significant differences (p<.05) between the columns of figures.

Plus signs (++) indicate borderline differences (p<.10) that are not statistically significant but that may have some intuitive value when interpreting the patterns of results.

Perceptions of Change (continued)

OVERVIEW: People noticed the new exhibits (especially the Ball Room) and the fact that *Busytown* was no longer in that hall.

What changes do you notice? **(n=140)**

37%	Mentioned specific new exhibits (Ball Room, robots, etc.)
29%	Missed/didn't see old exhibits (sand, *Busytown*, store)
20%	There are different exhibits, things changed
12%	There are more exhibits
7%	More interactive, more fun
7%	New, fresh, clean, the exhibits work
7%	More complicated, geared toward older kids
4%	The 2nd floor is open
5%	Technology, inventing
2%	Other

<u>Sample of answers:</u>
New stuff, ball stuff, had an arch before, second floor's open
More stuff
More inventing stuff (Ball Room)
Didn't know about upstairs
Teach kids more, active/ involved
Busytown is gone
Balls, everything seemed cleaner, fresher, new things on the far end
Moved things around
Richard Scarry gone, play area gone
Whole thing, phenomenal, Ball Room, tech area, water
Moved around, water thing, boat, computer lab
Ball Room, robots, placement
Big crane, lot of stuff
No kids play area
Ball Room, everything
Bigger, rearranged things
Busytown gone, Ball Room, layout
Moved around, new exhibits
Richard Scarry gone, more stuff, Ball Room
New things, improved
More exhibits
Robots
Reworked little kids' area upstairs, ball area
Computer lab, moved things around

A.2. Reason for Visiting

OVERVIEW: Although only 2% of the visitors said they came specifically to see the new exhibits, almost 40% of <u>repeat visitors</u> said this exhibition hall was *a factor* in their decision to come to the museum.

Today did you come to OMSI to see or do something specific, or just to check it out?

<div style="border:1px solid black; display:inline-block; text-align:center;">ADULT EXIT
INTERVIEWS</div>

	Overall Sample		OMSI Members	Repeat Visitors	First-time Visitors
just to check it out	68%	**	75%	53%	80%
to see something specific	32%		25%	47%	20%

What specific?			
Grossology	18%			
Imax movie	6%			
Submarine	3%			
Turbine Hall exhibits (Ball Room, Lab)	**2%**			
Playground	2%			
Planetarium / Laser show	2%			
other	2%			

Was this exhibit hall a factor in deciding to come?

	Overall Sample		OMSI Members	Repeat Visitors	First-time Visitors
yes	30%	**	43%	33%	3%
no	70%		57%	67%	97%

B. Extent of Use of the Space

Some data were collected about the use of selected exhibits and this information is presented here as an added context for the main results (this is not a tracking study nor an exhaustive investigation of patterns of use). Some highlights from this section are:

♦ It appears that most visitors are venturing beyond the turbine in the middle of the hall: 70% reported that they saw the water exhibits in the back and 50% said they went upstairs.

♦ About two-thirds of the visitors went into the Ball Room (mostly families with kids, not so many adult-only groups). Only a small proportion of visitors saw *only* the Ball Room (8%).

♦ Among a sampling of other exhibits and labs that people were asked about, the Physics Lab had the most use (38%), while approximately 20% of the visitors stopped at Tech Lab, Back to the Drawing Board, Oregon Inventors, or Tech Choices.

B. Extent of Use of the Space

OVERVIEW: A big question about visitors' use of this hall is whether the large black turbine in the middle is an obstacle to people's exploration of the whole hall. The answer is NO: about two-thirds of the <u>visitor groups</u> ventured to the far water exhibits. Half of the visitors went up to the mezzanine and smaller proportions saw the three labs–Tech Lab had the lowest use, only 18% of visitor groups stopped there. Visitors' patterns of use of the exhibits in Turbine Hall vary as a reflection of some characteristics of the visitor groups. The Ball Room was well used by families with young children (75%+), but only one-quarter of adult-only groups went into the room. Adults were more likely than families to do the Physics Lab, and families with preschoolers were least likely to do the Physics or Chemistry Labs.

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                                    │  ADULT / CHILD      │
                                    │  EXIT INTERVIEWS    │
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How much did you see today? **[using map]**

	Overall Sample (n=358)		Adult Only (n=38)	Under 6 Only (n=96)	Mixed Ages 0-17 (n=78)	Age 6+ Only (n=135)
Water Exhibits	70%		84%	65%	69%	70%
Ball Room	67%	**	26%	76%	83%	62%
Mezzanine	50%		58%	42%	59%	47%
Physics Lab	38%	**	58%	26%	41%	38%
Chemistry Lab	23%	**	29%	9%	26%	30%
Tech Lab	18%		21%	15%	18%	19%

Asterisks (**) indicate statistically significant differences (p<.05) between the columns of figures.

Plus signs (++) indicate borderline differences (p<.10) that are not statistically significant but that may have some intuitive value when interpreting the patterns of results.

Extent of Use (continued)

OVERVIEW: Most <u>kids in the target age range</u> also said they stopped in the Ball Room (72%), but staff suspicions about lower use of some other exhibits (shown on a photo board) were confirmed–about one-third saw Build an Aqueduct, one-quarter stopped at Program a Robot, and one-fifth used each of the other three exhibit elements, Tech Choices, Drawing Board, and Oregon Inventors. A third of the kids said they didn't stop at *any* of the exhibit elements shown on the photo board, except the Ball Room. The patterns of use were similar among younger and older kids and there was only one significant difference between girls and boys. Girls were more likely than boys to stop at the Drawing Board.

	CHILD EXIT INTERVIEWS				

Did you stop here? [using photos]	Kids (n=150)	Boys (n=71)		Girls (n=72)	Age 8-10 (n=84)	11-14 (n=61)
Ball Room	72%	72%		73%	76%	67%
Build an Aqueduct	38% [1]	43%		34%	40%	37%
Program a Robot	25%	31%	++	18%	23%	28%
Tech Choices	20%	18%		22%	18%	23%
Back to the Drawing Board	19%	12%	**	26%	23%	15%
Oregon Inventors	18%	17%		19%	15%	23%

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[1] This figure is probably an over-estimate of use of the Build an Aqueduct exhibit because some children looked at the photo and said they stopped here but when asked a follow-up question they talked about other exhibits in the water area, e.g., sailboats, so we think they may not have actually seen this exhibit. (Not everyone was asked a follow-up about this exhibit so we can't always tell if they were mistaken.)

C. The Appeal of Innovation Station

Visitors' reactions to the exhibition are explored in this section of the report. Several of the exhibit team's goals are addressed here:

1. Does the space feel inviting and fun?
2. Are the exhibits engaging for people of all ages?
3. Are the exhibits equally appealing to male and female visitors?

The key results are:

♦ This hall has succeeded in creating a positive ambiance for most visitors–86% chose the words "fun" or "exciting" to describe their experience, and about half thought it was "inviting" or "friendly." About half of the *adults* felt that the hall was "loud" (a lot of people and activity). Very few people described it as "too technical."

♦ This exhibition has succeeded in appealing to the younger portion of the target age group of 8-11 year olds. Adults of all ages visiting with children of all ages also gave moderately positive ratings. Children aged 12-14 were harder to please.

♦ The new Turbine Hall is equally appealing to men and women as well as boys and girls. This is an accomplishment for a technology exhibition because girls and women typically express less interest in this subject matter. The results also indicate that kids as young as age 8 or 9 are aware of this potential gender difference–both girls and boys *believed* that other girls in their class would be less interested in this exhibition than boys in their class.

♦ There is evidence that kids thought some of the exhibits were complicated and hard to understand.

C.1. Describing the Experience and Ambiance

OVERVIEW: The new *Technoquest* exhibits have succeeded in creating a positive ambiance for most visitors (e.g., most people described the atmosphere as "fun," and only a tiny percentage thought it was "too technical"). Adults described the feeling of this hall as "fun," "loud," and "mechanical" (top three words chosen from a list of nine descriptors). Kids in the target age group most often chose "exciting" and "fun" to describe the feeling in this hall. Kids were much less likely to think it was "loud" or "over-stimulating" compared to adults. For the most part, perceptions of the experience were similar across gender–a major accomplishment–although an occasional gender difference seems to linger.

Which of these words describes the feeling or atmosphere of this Hall?
(choose all that apply)

	ADULT / CHILD EXIT INTERVIEWS		
	Overall (n=126)	Adults (n=65)	Kids (n=61)
Fun	68%	66%	69%
Exciting	58%	40% **	79%
Mechanical	49%	49%	49%
Inviting	38%	41%	34%
Loud	37%	52% **	21%
Friendly	32%	32%	31%
Light & airy	17%	20%	14%
Over-stimulating	11%	20% **	2%
Too technical	5%	8%	2%
selected Fun OR Exciting	86%	83%	89%
selected Inviting OR Friendly	54%	54%	54%

Significant difference among audience segments:

♦ Girls are more likely than boys to select MECHANICAL (62% vs. 22%), but such a difference was not evident between women and men.

♦ Men are more likely than women to pick FRIENDLY (46% vs. 19%) (but no difference if combining friendly+inviting: 58% vs. 51%)

♦ Women are more likely than men to pick EXCITING (58% vs. 18%) (but no difference if combining fun+exciting: 88% vs. 81%)

C.2. Overall Ratings of the Exhibition

OVERVIEW: Overall, *Technoquest* received moderately positive ratings[2] (42% of kids and 35% of adults gave it a '9' or '10' on a 10-point scale). Kids on the lower end of the target age range (8-9 year olds) gave higher ratings than older kids or adults. The lowest ratings came from 12-14 year olds. This pattern is not atypical for science exhibitions–younger kids tend to be more enthusiastic while older kids are more discriminating (or jaded). There were no statistically significant differences among other audience segments, indicating that there was broad appeal (men vs. women, boys vs. girls, older vs. younger adults, members vs. non-members, first-time vs. repeat visitors, and "techies" vs. people with low-tech occupations). Adults visiting with children (of any age) gave slightly higher ratings than adult-only groups (37% vs. 18% high; p<.06). Kids who said they were 'very comfortable' with technology gave higher ratings than those who were less comfortable (61% vs. 36% high ratings of the exhibition). (But we can't make conclusions about causality here–kids who said they really liked the exhibits may have felt more confident when asked at the end of the interview to rate their comfort level with the subject matter.)

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ADULT / CHILD
EXIT INTERVIEWS
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How would you rate your opinion of this exhibit hall on a scale of 1 to 10? (not at all interesting to extremely interesting)

	Adults (n=344)		Kids (8-9) (n=94)	Kids (10-11) (n=113)	Kids (12-14) (n=65)
high (9-10)	34%	**	54%	40%	21%
medium (7-8)	52%		37%	48%	65%
low (1-6)	14%		9%	12%	14%
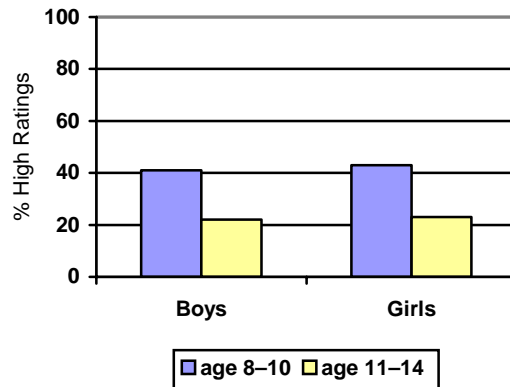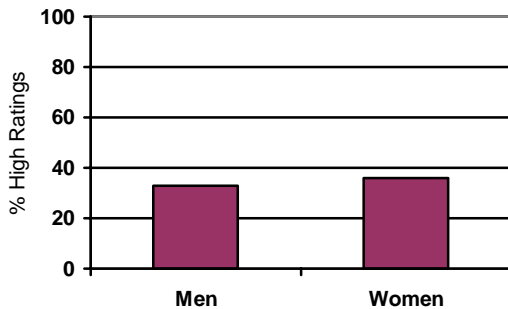
[2] Interpreting visitors' ratings on 10-point scales is based on years of experience with museum visitors and using follow-up questions to ask what their ratings mean or why they gave a particular number. Consistently over time and a variety of settings, we have found that '9' or '10' means an excellent experience which is completely positive, a '7' or '8' means a moderately positive rating which can be accompanied by some misgivings or not so enthusiastic support, and a '6' or lower number indicates a disappointing experience or one with substantial misgivings. The highest ratings we've seen (national award winning, and very popular among visitors) have been in the range of 75%-80% very high ratings ('9' or '10').

(KIDS) ***Why did you give that rating?***

31%	Fun, cool, awesome, exciting
11%	General positive: interesting, I liked it
15%	Liked Bottle Rockets, air rockets [3]
13%	Lots of stuff, new exhibits
11%	I like science, learned a lot
10%	Liked Chemistry Lab, Physics Lab [3]
9%	Liked Ball Room
5%	Liked robot things (program a robot, robot arms, talk to robot)
5%	Liked water exhibits, boats [3]
3%	Liked Tech Lab, computers
6%	Other exhibits mentioned (airplanes, space shuttle)
17%	Mixed: some things good & some not as interesting, not hands-on
7%	Negative: boring, liked old exhibits better
7%	Too hard, confusing, didn't understand something
5%	It has more for younger kids, not so much for 11+ year olds
2%	Crowded, long lines, couldn't do much

Sample of answers: if High rating
Fun, there's a whole bunch of places and you can do a whole bunch of stuff
Rocket, Chem Lab
Because when you set the balls they suctioned through the top thing
Really fun, and new things
Liked most of it, none of it wasn't interesting
Really cool, Water Rockets
Everything! Computer Lab, making robots
All the bottles that shoot
I like science, it's cool, I like to study how it works
Lots of stuff that catches your eye and is fun
Creative, Robot Arms

Sample of answers: if Medium rating
I liked it
Like the Bottle Rockets
It's okay for little kids but not very interesting for us (older), except the Labs
Cool and fun
Cool gadgets to play with
Cool activities, sometimes it was boring but probably good for younger kids
Liked Chem Lab, didn't like Robot Arms, didn't make sense, no instructions
There are more new activities
It's really fun but there are some things I don't want to do
Interesting to learn about it

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[3] Note that visitors were not asked to differentiate between old exhibits (that were retained from *Engineer It!*) and new exhibits, since they all illustrate technology in some way or other.

Sample of answers: if Low rating
Before, it was organized
Fun
It's okay
Not that interesting, so many things about making airplanes, I like the water stuff
Liked Water Rockets
It doesn't interest me
Not very interesting, there could be more things like the Water Rockets
Really crowded, didn't get to do as much as I wanted

C.3. Perceived Gender Differences in Appeal

OVERVIEW: Boys and girls gave identical ratings of their own interest in this exhibition.
However, most kids (both boys and girls) believed that girls in their class would not like it as
much as boys in their class. These gender stereotypes are apparent at all age levels.

CHILD EXIT INTERVIEWS

What rating would the girls/boys in your class give to this exhibit hall?
(on a scale of 1 to 10)

	My rating /**Boys** (n=128)	My rating /**Girls** (n=138)	Boys in **my class** (n=150)		Girls in **my class** (n=150)
high	40%	41%	44%	**	21%
moderate	48%	49%	37%		45%
low	12%	11%	19%		34%

Boys and girls gave similar answers–both thought that girls in their
class would not like this exhibition as much as boys in their class.
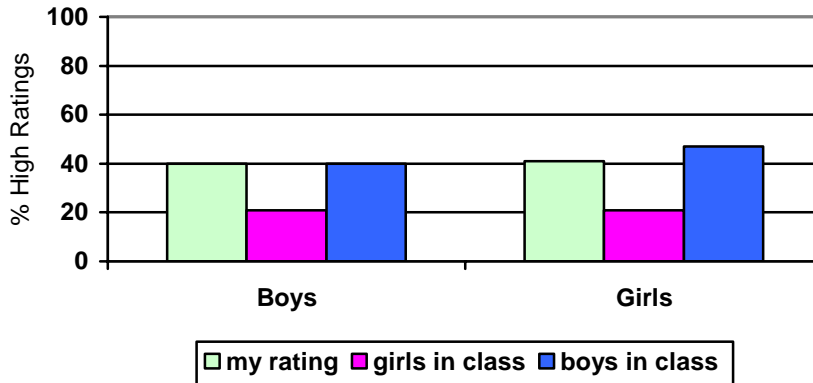
Perceived gender differences are apparent at all age levels
(while the ratings decline as age increases)
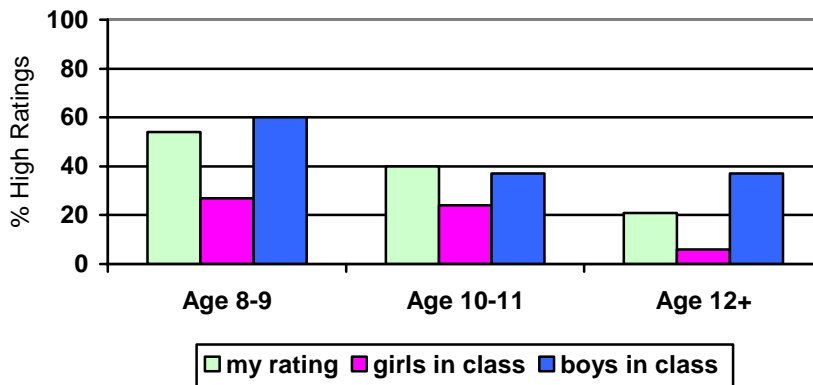
C.4. What Visitors Liked Most

OVERVIEW: Adults appreciated the engaging hands-on activities for children, the Ball Room, the water exhibits, the Physics and Chemistry Labs, and the variety of different exhibits, among other things. Kids also liked the Ball Room, Bottle Rockets, and Lab demonstrations.

What did you like about it?

<div style="text-align:right; border:1px solid; display:inline-block;">
ADULT / CHILD
EXIT INTERVIEWS
</div>

Overall (n=358)	Kids (n=140)	Adults (n=218)	
25%	28%	23%	Ball Room
24%	7%	34%	Hands-on/ engaging play/ good for kids
20%	28%	16%	Water activities especially bottle rockets, boats
12%	15%	10%	Physics lab, demos, Chem Lab, lasers
7%	1%	10%	Amount of different exhibits/ lots to do/ variety
6%	7%	5%	Experiments/ inventing/ building/ creating
6%	6%	7%	Interesting/ educational
6%	9%	4%	Everything/ cool/ general "positive"
4%	1%	6%	Something for all ages
3%	3%	4%	Robots
3%	2%	3%	Something upstairs/ sound waves/ magnifier
3%	4%	2%	It's new/ exhibits changing
3%	5%	2%	Computer lab
3%	4%	2%	Space shuttle/ orbit
2%	3%	1%	Make your own planes
2%	2%	2%	Paper cups
2%	1%	2%	About electricity
1%	1%	1%	Earthquake table
8%	9%	8%	Other exhibits
2%	1%	2%	Negative comment
3%	3%	3%	Don't know/ blank

What Visitors Liked Most (continued)

Sample of ADULTS' answers:
Ball Room, water rocket
Hydro-power, concept of turbines (using building for exhibit)
Paper cups, Ball Room, upstairs controller, individual hands-on
Detail about electricity
Variety, when kid gets older he can appreciate it more
Pepper's Ghost, mirror upstairs
All the cool things, interactive things
Hands-on especially water
Kids could interact
Demos on water, air, sound waves
Educational, fun
Hands-on, simple explanations about technology
Simple physical exhibits, I'm an engineer and have done it all before, for kids
Held son's interest (13 yrs)
Interactive, fun
Ball Room
Watching kids
Interesting, adult-oriented, but still for kids
Ball Room, bottle rockets (better for older kids, though)
Paper airplanes
Space shuttle, music making in computer lab

Sample of CHILDREN'S answers:
Rockets, make your own flying machine, Ball Room fun for everyone
Ball Room, science stuff (laser lab), educational
New things to do
The Ball Room, thing where you put air and water and shoots
Everything, Ball Room
Chemistry Lab
Ball Room, Chemistry Lab
Experiments
Science, bottle rockets
Rockets, water and air, space capsule
Computers
Ball Room, rockets
Rockets, spaceship
Experimental, hands-on
Ball invention thing, colors & glasses, sound waves upstairs
Robots, elevator, crane
The water and ball area
All of it, interesting, design templates
Hands-on things
Turbine, train demo, Chemistry Lab

C.5. Children's Ratings of Selected Exhibits

OVERVIEW: Children in the target age range (8-14) were shown photos of six exhibit elements and asked to rate them (if they stopped there); the results indicate a wide range of appeal. Most children thought the Ball Room was "great" or "good" (but first-time visitors were significantly less enthusiastic about it for some reason). Two other exhibits were also appealing to most kids who used them–Build an Aqueduct and Technology Choices. Kids expressed less enthusiasm with the other exhibits: Program a Robot (maybe because it's difficult?), Back to the Drawing Board (it's not that exciting? it's difficult?), and Oregon Inventors (it's not interactive, just looking and reading).

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┌──────────────────┐
│  CHILD EXIT      │
│  INTERVIEWS      │
└──────────────────┘
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Did you stop at these exhibits? (photo board)
Tell me if it was Great, Good, OK, or didn't interest you.

		Saw It	Great	Good	OK	Didn't Interest
(n=108)	Ball Room	72%	58%	19%	17%	6%
(n=57)	Build an Aqueduct	38%	47%	37%	11%	5%
(n=36)	Program a Robot	25%	22%	30%	22%	25%
(n=29)	Tech Choices	20%	(41%)	(38%)	(17%)	(3%)
(n=28)	Back to the Drawing Board	19%	(25%)	(39%)	(25%)	(11%)
(n=27)	Oregon Inventors	18%	(26%)	(33%)	(37%)	(4%)

(percentages in parentheses are based on
    small sample sizes and may be unreliable)

"Great" ratings of the Ball Room:
68%   among kids who have seen the new *Technoquest* exhibits before
63%   among kids who visited the old Turbine Hall
37%   among kids visiting OMSI for the first time

C.6. Suggestions for Improvement

OVERVIEW: Adults and kids had some complaints about broken or under-functioning exhibits, confusing exhibits, and the chaos in the Ball Room. About 60% of the visitors couldn't think of anything that needed improvement (a typical result).

Is there anything that needs improvement or repair,
or could be explained better?

ADULT / CHILD
EXIT INTERVIEWS

Overall (n=232)	Kids (n=79)	Adults (n=153)	
10%	13%	8%	Broken exhibits/ slow computers/ bad scissors
7%	5%	8%	Ball Room: didn't like, no purpose, too loud, crazy
4%	9%	2%	Couldn't understand how to use something
4%	1%	5%	Explanations confusing, content too complicated
3%	0%	5%	Too "old" for my kids
3%	3%	3%	More staff to answer questions
2%	4%	1%	Chemistry and physics lab-rotate/ new experiments
2%	0%	3%	Accessibility/ benches, handicapped, ventilation
1%	0%	1%	Bigger Ball Room
1%	1%	1%	More Chem Lab hours
4%	0%	3%	Other
59%	58%	60%	No, nothing

Suggestions for Improvement (continued)

Sample of ADULTS' answers:
Electricity part seems complicated, also reading too much for kid
Leak in bottle rocket
No, less busy, want to come back
Broken displays (mezzanine)
Bigger Ball Room
Needs sit down area
Ball Room wasn't good, just throwing balls
Wheelchair accessibility: serpentine edges, can't get close enough to exhibits
Ball Room is loud, need ear plugs
Air things broken
Make a movie: couldn't see through slots
Don't know intended age group, maybe better when kid is older
Some canisters in Ball Room weren't working right
Ball Room could be easier to accomplish, things too chaotic
Electric motors explanation is confusing, totally baffling...
Needs to be a lot more in-depth explanation if targeting everyone
More signs in Ball Room about throwing balls at people
Some things kid needs to grow into
Ball Room, some things unclear if they were working, didn't know how to do
Windmill had broken piece, wrench fell off in music thing
Scissors at the paper cups air thing should be connected to desk
Ball Room could be bigger
Stuff in Chemistry Lab was hard to follow
Pumps: there was no water, wasn't turning on
Need to give solutions to things, give reasons why force/motion

Sample of CHILDREN'S answers:
Unclear about upstairs ball controller
More workstations! Only 2 for rockets, need more, lines
Few broken things, buttons
One fan (Float Table) doesn't work
A lot of the computer stuff is not clear, buttons aren't labeled well
More Chemistry Lab hours
Crane at far end has a problem
Water things, didn't tell you what to do
The wire by the robots, not clear what the instructions are
Sometimes things that aren't working, various things
Make it so blue balls don't fly everywhere, bonk people
It wasn't interesting, pipes change around in water (???)

Suggestions for Improvement (continued)

OVERVIEW: Over half of the kids in the target age group agreed that some of the exhibits were complicated or hard to understand. Typically, people are reluctant to agree with a negative statement like this, so this high proportion indicates real difficulties. One-quarter of the children agreed that there was too much reading, but only 9% were definite about this. There were no statistically significant differences between boys and girls or between younger vs. older kids.

Here are some different statements and opinions
about the exhibits in this hall. [5 statements; other results in section D2 & D3]
Does it describe your experience?
You can say definitely, somewhat, or not really:

> CHILD EXIT
> INTERVIEWS

	Definitely	Somewhat	Not Really
some exhibits were complicated & hard to understand	22%	33%	45%
there was too much reading	9%	14%	77%

Analysis by gender and age:	Boys	Girls	Age 8-10	Age 11-14
% who said "definitely" or "somewhat"				
complicated & hard to understand	51%	59%	58%	50%
too much reading	27%	18%	24%	20%

D. Analysis of Interpretive Goals

This section presents the findings about visitors' perceptions of intended themes and goals of the new *Technoquest* exhibits (e.g., technology, the process of invention, relevance to everyday life, etc.). The key results are:

♦ Visitors have only a vague *top-of-mind* conception of the overall theme of the exhibition; they cite a variety of topics including science, the physics/mechanics of objects, technology and rockets. Using a different measurement strategy (providing a list of descriptors), the most frequently chosen phrases to describe the exhibition were "playing & exploring," "having fun," "force & motion," and "science." However, most visitors (82%) *recognized* one or more of the intended themes–technology, inventing, designing, or engineering.

♦ In defining "technology," most children and adults think of electronics such as computers, television, and video games. Very few children expressed a lack of comfort with technology.

♦ Most children (66%) said they saw things in this exhibition that relate to everyday life (e.g., computers, airplanes, rockets, water). In adult interviews concerning specific exhibits, relevance to everyday life was clear for Tech Choices and Oregon Inventors, but much less apparent for the Ball Room, the Float Table, and Program a Robot.

♦ Almost all children said that they learned about how things work, and many (63%) felt that they had designed or invented something. Four of the six individual exhibits were described by adults as "encouraging creativity" and "showing there's more than one way to do things" (Ball Room, Float Table, Oregon Inventors, Build an Aqueduct).

D.1. Visitors' Perceptions of the Main Idea

OVERVIEW: Visitors are not aware of any overriding theme for this hall, i.e., technology. They gave many different answers when asked what this exhibit hall is about. The most frequent category of answers among adults was that it's about physics, how things move or work, followed by "science." One-quarter of the adults (and fewer kids) mentioned technology, invention, or discovery. After the simple answer, "science," kids were less likely to generalize, and they tended to refer to specific exhibits or content areas such as electricity, space & flying, robots, or water.

What would you say this exhibit hall is about?

ADULT / CHILD
EXIT INTERVIEWS

Overall (n=358)	Kids (n=140)	Adults (n=218)	
31%	30%	31%	Science
33%	17%	42%	Physics/ motion/ how things work/ mechanics
9%	3%	13%	Physics
8%	4%	10%	How things move/ energy, motion
8%	3%	11%	How things work
8%	7%	8%	Industry/ mechanics/ engineering
20%	14%	25%	Technology / invention / discovery / imagination
8%	5%	11%	Technology
8%	7%	9%	Invention/ imagination, creativity, problem-solving
4%	2%	5%	Discovery/ experiments/ exploration
22%	30%	17%	Specific Subjects
10%	16%	6%	Space/ rockets/ flying/ wind/ air/ gravity
5%	6%	4%	Electricity
4%	4%	5%	Water/ ships
3%	4%	2%	Robotics
7%	6%	7%	Fun, hands-on, for kids
5%	4%	5%	Educational, learning
2%	0%	4%	Relating science to everyday life
4%	4%	4%	Other
8%	11%	6%	Blank, don't know

Perceptions of the Main Idea (continued)

Sample of ADULTS' answers:
Discovery
How things work
Gravity
Physical science
Science
Physics
Water
Getting hands on involvement
Mechanics
Science, technology, physics
Basic physics lessons
Science people can relate to, things they've seen before
Rockets, planets, how to fly
Technology
Basic learning, simple learning
Inventing, concepts
Experiments
Movement, space and air, water
Information on how things work
A bunch of ideas, making different things, see how things work
Robotics and rocketry
Teach kids ways certain things work

Sample of CHILDREN'S answers:
Energy, motion
Inventing/creating stuff
To educate
How things travel
Science
Electricity
Science, electronics
Physics
Variety, mainly stuff where you get to move things
Space
How rockets fly and things get up into the air
Science and fun
Learning different things
Mechanics
Different stuff, engines, flight
How stuff works
Robots

Perceptions of the Main Idea (continued)

OVERVIEW: It's usually helpful to measure key concepts in more than one way. Using a second strategy to get at visitors' perceptions of the main idea of this hall, people were presented with a list of 10 words or phrases and asked which ones best described it. Visitors selected multiple descriptors. Overall, about 80% of kids and adults selected at least one of the intended themes (technology, inventing, designing, or engineering). Kids were more likely than adults to pick the "inventing" theme, while older kids were more likely than younger kids to choose "engineering" and "designing." The top three choices among adults were "playing & exploring," "force & motion," and "having fun." Older kids chose "technology," "having fun," "science," and "inventing." Younger kids were most likely to select the basic answer, "science," but they also chose "having fun," "playing," and "inventing."

Which of these words or phrases best describe
what this exhibit hall is about?

ADULT / CHILD
EXIT INTERVIEWS

	Overall Sample (n=358)	Adults (n=218)		Kids Age 8-10 (n=72)		Kids Age 11-14 (n=50)
playing & exploring	55%	**59%**		**50%**		42%
having fun	50%	**49%**		**54%**		**52%**
science	50%	42%	**	**74%**	**	**52%**
force & motion	48%	**56%**	**	22%	**	46%
technology	46%	43%		47%		**56%**
inventing	42%	35%	**	**51%**		**50%**
engineering	37%	40%		26%	**	48%
designing things	26%	26%		17%	**	32%
wind & water	24%	25%		21%		20%
computers	14%	12%		13%		20%
proportion who selected one of the key themes:	82%	83%		76%		90%

technology, inventing, designing, OR engineering

D.2. Visitors' Associations with Technology and Connections to Everyday Life

OVERVIEW: Visitors primarily think of computers when asked about technology (the same finding as the "front-end" research). Although this exhibit hall was not just about computers, this preconceived association is very strong due to the context of electronics in people's everyday lives. It is encouraging, however, that the second most frequent answer among adults was that advancement & invention came to mind when they thought of technology. Kids mentioned electronics and robots, among other things.

What comes to mind when you think of technology?

	Overall (n=358)	Kids (n=140)	Adults (n=218)	
💻	46%	43%	48%	Computers/ related equipment
✂	15%	7%	20%	Invention/ improving life/ advancement/ progress
💻	8%	16%	4%	Electronics
	7%	4%	6%	Science/ physics
✈	6%	6%	7%	Mechanical things, machines
✂	6%	5%	6%	New/ innovation/ cutting edge/ modern
✈	6%	10%	4%	Robots
💻	5%	9%	1%	Televisions, video games, electronic gadgets
✈	4%	4%	4%	Engineering/ structural design/ building things
	4%	0%	6%	How things work
✈	3%	5%	1%	Cars, rockets, planes
	2%	1%	3%	Negative comment
	2%	2%	2%	Positive: interesting, fun, exciting
	9%	9%	10%	Other
	7%	12%	4%	Don't know/ blank

Principal categories, re-coded:

💻 = 54%	51%	58%	Computers, electronics, TV's, video games
✂ =20%	25%	12%	Invention/ advancement/ innovation/ cutting edge
✈ = 15%	12%	18%	Mechanical things: machines, robots, cars, rockets

Associations with Technology (continued)

Sample of ADULTS' answers:
Science and learning, what makes things work
Computers
Science
Fast pace
Computers, videos
Mechanical things
New and improved
New, inventive things, cutting edge science
Improving
Space
Inventions
High tech computers and robots
Physics
How energy is created, computers
Future
Computers, robotics
Computers, science, advancement

Sample of CHILDREN'S answers:
Robots
Computers
It's cool
Fun with learning
Computers
Electricity
Computers, buildings, lots of stuff
Computers, games, technical stuff
Computers, cars, rocket ships
Lots of stuff, space
Computers, discovery
Computers, rockets, airplanes, TVs
Computers
Electricity and telephones
Smart people
Science, inventing
Computers, rockets, TVs, machines
Video games

Children's Comfort with Technology

OVERVIEW: Children were asked to rate their comfort with technology, using the same scale that was developed for the formative studies. Kids leaving Turbine Hall indicated similar levels of comfort with technology compared with the sample of kids in the formative studies (where each child interviewed had used one exhibit mock-up). Boys and girls rated themselves similarly as well. There were no differences in comfort level among younger vs. older kids or first-time vs. repeat visitors. This pattern of similarities suggests that if there is a reliable and measurable level of "comfort" with technology, it is probably shaped by people's everyday lives and not by a short experience with a museum exhibit or exhibits.

CHILD EXIT INTERVIEWS

This whole exhibit hall is about technology. In general, how comfortable are you with the idea of technology? Do you think of yourself as a 1, 2, 3, 4, or 5? **[from the scale]**

	Formative Studies (107 kids)	Summative Study (150 kids)	Boys (n=74)	Girls (n=73)
Very comfortable	44%	38%	38%	40%
Interested, accepting	41%	42%	40%	41%
Ambivalent	12%	14%		
Challenged	3%	5%	22%	19%
Very uncomfortable	0	1%		

Children's Connections to Everyday Experience

OVERVIEW: One goal of this exhibition was to make technology personally meaningful by connecting to visitors' everyday experiences. The results suggest that this goal was achieved: two-thirds of the children felt that they had seen some familiar things in this exhibition that relate to everyday life. They cited examples such as computers, paper cups, rockets, water, towers/bridges, balls and light bulbs. There were no significant differences between boys and girls or between younger and older kids.

Here are some different statements and opinions about the exhibits
(5 statements; other results in sections D3 and C6)
***Does it describe your experience?* (of the whole hall)**

CHILD
INTERVIEWS

	Definitely	Somewhat	Not Really
I saw familiar things that relate to my everyday life	43%	23%	34%

(if definite or somewhat) ***Give an example of something you saw that relates to your everyday life.* (referring to entire hall)**

13%	Computers
7%	Airplanes, paper cup helicopters, sail boats
5%	Rockets, bottle rockets, (maybe air rockets too)
5%	Water, toilet, pumping water, conserving water
5%	Tower, bridge building
4%	Balls
4%	Electricity, light bulbs
4%	Making stuff, drawing, doing projects
3%	Chemistry Lab
3%	Space Shuttle
3%	Inventions (seat belt, screwdriver, sneakers)
3%	Everything
10%	Other exhibits (robot arm, keys, pop cans, mirrors, magnets, vacuum)
8%	Blank, no answer
[34%	"not really" as shown above]

Children's Connections to Everyday Life (continued)

<u>**Sample of CHILDREN'S answers:**</u>
The Ball Room, I use balls a lot
Can make something, reminds me of school projects
Keys and how they work
The Space Shuttle stuff, they sometimes show that on TV
The science
Computers
Toilet thing, Chemistry Lab, flubber
Electric thing and mirror thing
Screwdriver
Sailboats, sails
Have a thing you trace like Robot Arms
Water pumps through town
Light bulb, typewriter
Wand thing
Drawing with stencils
Water rocket
Just seemed that way
Rolling cans back and forth, we have a class that makes that kind of thing
Seat belts, we build paper airplanes at home
The air rockets
I see a lot of crane things, we have a computer at our house

Adults' Connections to Everyday Life

OVERVIEW: Half or more of the adults were able to make connections between everyday life and three of the six exhibits that were studied directly: Tech Choices, Oregon Inventors, and Build an Aqueduct. Only a minority of adults felt that the other three exhibits were relevant to everyday life (Ball Room, Float Table, Program a Robot). Visitors made associations with familiar household objects and resources they use everyday such as vacuums, plumbing, cell phones, and toys. Two of the exhibits (Oregon Inventors, Ball Room) elicited more conceptual responses such as "creativity" and "problem solving."

ADULT EXHIBIT INTERVIEWS

Do these phrases describe this exhibit? **% saying "definitely"**	Ball Room	Float Table	Program a Robot	Tech Choices	Oregon Inventors	Build an Aqueduct
Feels relevant to everyday life	16%	21%	30%	70%	72%	54%

Tell me something this could remind you of in your daily life:

(referring to Ball Room)

Vacuum cleaner
> *the vacuum*
> *hooking up the hose to the vacuum cleaner*
> *vacuum cleaner*

Games
> *playing catch*
> *throwing a ball into the wind*
> *playing sports*

Creativity
> *cause and effect*
> *problem solving*
> *you have to be creative*

Adults' Connections to Everyday Life (continued)

(referring to Float Table)

Toys

> *kite flying*
> *my three kids are always making airplanes*
> *paper airplanes*
> *kids like to throw things, that curiosity of movement*

Propellers

> *Ceiling fans*
> *Different airplane propellers*
> *Flying helicopters*

(referring to Program a Robot)

Organization

> *How to rearrange schedule and furniture*
> *Order of operations are important (I'm a math teacher)*
> *You have to do things in a certain order for it to work*

Computers

> *I have my own business, computer work*
> *Daily computer use, have to do it the way it's programmed*
> *I am working on a Lego robotic program*

Cars

> *Directions for getting somewhere*
> *Use those kinds of directions when you're driving*
> *Figuring out where to go*

(referring to Tech Choices)

Cell phones

> *I don't want a cell phone tower next door, but I use a cell phone*
> *How I do things, I use my cell phone every day*
> *Cell phones, not in my backyard*

Genetically modified food

> *What I put on my table, foods I eat, whether I want genetically modified foods*
> *How much genetically modified foods are in our food*
> *People don't know foods are modified genetically*

Diapers

> *Choosing between options [disposable diapers]*
> *Reusable vs. disposable diapers*

Adults' Connections to Everyday Life (continued)

(referring to Oregon Inventors)

Commonly used objects
> *Leatherman*
> *seat belts*
> *car seats*
> *everyone wears shoes*

Creativity
> *There is a solution to any problem*
> *Trying to better an idea*
> *Fixing things, working with what you have*
> *When you have something that doesn't work, think of a way to do it better*

(referring to Build an Aqueduct)

Where we get water
> *How I get water when I turn my tap on*
> *Drinking water, flushing the toilet*
> *I have to be reminded that water comes from somewhere*

Not available everywhere
> *When I lived in a foreign country, water was in the well in the courtyard*
> *Not mine, but I spent most of my life overseas*
> *It's relevant to other people's lives who use that system*

Irrigation
> *Yard irrigation*
> *Rural farming is 15 minutes from where I live*
> *Watering a garden, sprinklers*

D.3. Designing and Inventing in This Exhibition

OVERVIEW: The vast majority of kids (88%) agreed that they had "learned a lot about how things work," and two-thirds of them felt that they had "designed or invented something." Children most frequently mentioned building bridges or towers and making the flying paper cups. Younger kids (age 8–10) and girls were more likely to say they had "definitely learned how things work." Familiar visitors and those who rated themselves as very comfortable with technology were more likely to say they had designed or invented something. It appears that, on repeat visits, new layers of experience open up.

Here are some different statements and opinions about the exhibits.
For each one, tell me does it describe your experience?
[5 statements; other results in sections C6 & D2]

CHILD EXIT INTERVIEWS			

		Definitely	Somewhat	Not Really
KIDS	I learned a lot about how things work	45%	43%	12%
KIDS	I designed or invented something	50%	13%	37%

Children who say they "definitely" learned how things work

**	53%	of girls
	38%	of boys

**	51%	of 8-10 year olds
	36%	of 11-14 year olds

Children who say they "definitely" designed or invented

**	61%	of those who are very comfortable with technology
	42%	of those who are less comfortable

**	63%	of familiar visitors (those who have previously seen the new hall)
	45%	of unfamiliar visitors (first-time seeing the new hall)

D.3. Designing and Inventing in This Exhibition (continued)

(KIDS: if Definitely or Somewhat) *What did you design or invent?*

14%	Bridge, tower on earthquake table
12%	Paper cups, helicopters
5%	Airplane
5%	Sailboats
5%	Ball Room (designed tubes)
5%	Chem Lab (flubber, fireworks)
4%	Computers
3%	Robots
9%	Other (air rocket, movie, time machine, pulleys, picture, tree house)
2%	Don't know
63%	Total who designed or invented something

Designing and Inventing (continued)

OVERVIEW: In order to get more in-depth information about children's understanding of the process, they were asked how and why their "designs or inventions" worked. About one-quarter of the kids expressed a clear understanding of the process and principles they had used in their inventions. About one-quarter of the kids could not explain why their invention had worked or not worked (and 16% said theirs didn't work the way it was supposed to, e.g., the tower or bridge fell down, the paper cup didn't float, the sail boat didn't sail). Of course, some kids made improvements or tried doing things differently if it didn't work the first time, so they may have learned more in the process. Remember that kids are not as articulate as adults.

> CHILD EXIT
> INTERVIEWS

How did that work? Why? (n=94 who designed or invented something)

28%	Reasonable explanation of how/why it works
6%	It worked b/c I tried different ways of doing it, made improvements
6%	It worked because I followed directions
14%	It worked well (no reason given)
16%	It didn't work well
26%	Don't know how or why it worked, weak explanation
4%	blank, didn't answer the question

Sample of answers: what did you design or invent? How did it work?
Bridge: take the blocks and try to build it, I don't know why they did it this way (dk)
Bridge, when pushed on top it didn't fall because weight on both sides kept it up (good)
Building, it was shaking on top but not bottom b/c I put a lot of structure at bottom (good)
Tower, earthquakes, press button and it shakes, fell down because straps not tight (good)
Building on earthquake things: fun but it kept crashing no matter what I did (didn't work)
Helicopters: I cut paper cups into strips, it worked because strips extended (good)
Cup that flies: spaced out and air blew it up (good)
Cups that fly, yes it worked, don't know why (dk)
Paper cup that flies, flew because air pushes inside cup and it goes up (weak)
Airplane: was cool, fun to throw it (?)
Airplane, second design worked because I did what computer told me to do (directions)
Built boats out of stuff that was there: I don't know why I did it that way (dk)
Sail boats, went out pretty well but it went backwards, spun things wrong (didn't work, good)
Computer: I learned about the hard drive and stuff (?)
Silly Putty (Lab): it worked because I followed the steps (directions)
How to shoot balls: I made machine, it worked, it went into a hoop (worked, unclear reason)
The people in game (Zoombini), fun, I like to create things (?)
Vacuum, worked well, because I can do it (?)
Pulleys and gears, it succeeded (no reason)
Made robot move, electrical wires onto fan, make move, fan goes, generator goes (good)
Time Machine: I had an idea but it didn't work (didn't work)
Weird shape (glass): put long side down on triangle but triangle didn't fit right (didn't work)
A different way to pump water: set up water pipes differently (experimented)

Designing and Inventing (continued)

OVERVIEW: Children were asked to describe "what they had figured out" at one of the exhibits shown on the photo board. Since the number of people who saw these exhibits is relatively small, it's not possible to numerically analyze whether kids understood the point of each exhibit, but an overall summary is possible. Nearly half of the children seemed to understand the exhibit about which they were being asked. About one-quarter of them couldn't recall or say much about it.

> CHILD EXIT INTERVIEWS

What did you do or figure out there?
[follow-up question if they stopped at an exhibit shown on photo board; there weren't enough answers about any single exhibit to quantitatively analyze them separately.]

46%	Reasonable answer: figured out the point of the exhibit
23%	Described what they did or read (but not the point) [4]
11%	Unclear, didn't understand
16%	Blank, don't know, don't remember, didn't really do much

Sample of answers: PROGRAM A ROBOT
Kind of hard to design a robot
Didn't understand it
Something about picking up blue rocks, making robots pick them up
Did it two times
Program a robot on screen, pick up blue blocks, move left and right, move around
Frustration, it's not easy to tell left and right

Sample of answers: BACK TO THE DRAWING BOARD
That you could draw from lots of small structures
That it takes a while to make something
Pencil was too fat, couldn't get it inside lines
My sister drew and I helped
How things can be improved and different
I didn't really use it
Made a house and squiggle thing
Drew with stencils and had fun
Drew a tree house

---

[4] These types of answers could possibly have been probed further to seek a better perspective on whether kids understood the principle of an exhibit, but, in the context of this interview, it didn't seem essential at the time.

What did you do or figure out there? (continued)

Sample of answers: OREGON INVENTORS
I can't remember, probably to see what they invented here
There's a lot of ways to invent stuff
I don't really remember it
Was looking for a pocket knife
Learn about science
The seat belt adjusted, she built it for her kids
Stuff I read
Use different things to make things

Sample of answers: TECHNOLOGY CHOICES
That you could figure out and make your choice on how things could work
Kinda boring
How technology tastes, things about earth science
Didn't do or figure out much
How many people choose to have a telephone pole by their house
Worked my brain with trick questions
How many people have seen a car, would you give up camera cell phone if in locker room
Didn't know things, asked myself if I would really do that

Sample of answers: BUILD AN AQUEDUCT
How they got water in the town in old days
We tried to get water to houses and we did, we had to make bridges to get to town
How to produce water for a community
Just played
Don't know
Turned water thing so she could turn wheel
Different ways to pump water
Push the thing, really easy, but don't understand where it goes when it overflows
How they transport water
Water goes through pipes to get to other places
How water can get to homes
Hard to get water to town
How water works in pipes under Oregon, gets pumped through big pipes
Water power can push it where you want it to go, depends on how fast it's going

Designing and Inventing (continued)

OVERVIEW: As a group, the new *Technoquest* exhibits evaluated in this research elicited a variety of reactions from visitors. Most visitors thought that (as a group) the exhibits encouraged creativity, demonstrated more than one way to accomplish a task, allowed playing around without a best result, and most did not emphasize following rules.

The Float Table, Ball Room, and Build an Aqueduct were most successful in combining creativity and play without being rule-bound. The Oregon Inventors illustrated these same lessons to a slightly lesser extent through stories about inventors of familiar products and improvements.

Two exhibits, Tech Choices and Program a Robot, produced more ambiguous visitor responses. None of the visitors thought that Tech Choices definitely inspired creativity, while about half thought it demonstrated that there is more than one way to do things. Program a Robot evoked a somewhat complex pattern of responses. Most visitors thought it demonstrated the importance of following rules (which is true about programming even though there may still be a variety of goals or ways of reaching a goal) and only about one-third thought it encouraged people to be creative. In contrast to this highly structured impression, most visitors also experienced more than one way to solve a problem and the freedom to play around.

> EXHIBIT
> INTERVIEWS
> method 3

Do these phrases describe this exhibit? **% saying "definitely"**	Ball Room	Float Table	Program a Robot	Tech Choices	Oregon Inventors	Build an Aqueduct
Encourages people to be creative	71%	95%	33%	0%	67%	72%
Shows that there's more than one way to do things	84%	93%	79%	51%	86%	88%
You can play around without caring which way works better	86%	86%	58%	did not apply	35%	70%
Shows that it's important to follow the rules	23%	7%	74%	did not apply	9%	19%

D.4. Considering the Good and Bad Consequences of Technology

OVERVIEW: Visitors see mostly good consequences of technology in the six specific exhibits that were investigated. Build an Aqueduct, Program a Robot, and Oregon Inventors were the most effective sources of observations about good consequences (90%+). Visitors to the Ball Room were least likely to recognize good consequences (62%). The ways in which visitors described the technologies as helpful often referred more to the exhibit than the technologies themselves. Some visitors said the exhibits are educational or raise awareness, while others merely identified specific technologies mentioned in the exhibits.

Visitors had a harder time identifying potential "bad consequences" of technologies as represented in these exhibits. About one-quarter of the visitors who were interviewed about Tech Choices and Oregon Inventors recognized something that could be bad; the proportion was lower for the other exhibits.

> EXHIBIT INTERVIEWS
> method 3

Did this exhibit illustrate technology that is good or helpful to people or society?
Is there anything that could be bad about the technology represented here?

% "yes" for each exhibit:	Good	Bad	both
Ball Room	62%	21%[5]	12%
Float Table	73%	12%	12%
Program a Robot	91%	14%	14%
Tech Choices	80%	27%	26%
Oregon Inventors	91%	28%	23%
Build an Aqueduct	98%	15%	14%

(if yes) *In what sense is it good or helpful?* **(**n=211 of 259 interviews**)**

27%	Provides information/increases awareness
23%	Identified specific "beneficial" technologies
7%	It's good for children
6%	It's a challenging or creative activity
5%	It illustrates the process or development
3%	It illustrates positive and negative trade-offs
5%	Other
8%	Blank, don't know

---

[5] These rows may add up to more or less than 100% because individual visitors may see both good and bad aspects of technology or not see any aspects as good or bad.

D.4. Considering the Good and Bad Consequences of Technology (continued)

(if yes) *In what way could it be <u>bad</u>?* (n=51)[6]

- Harmful to the environment or society
- Could be used for evil purposes
- Could accidentally harm individuals
- Trade-offs/ technology not always good
- Too much technology/ it's out of control

---

[6] The "bad" technology examples are not presented quantitatively because a relatively small number of people (20%) identified ANY "bad" consequences of technology.

E. Studies of Individual Exhibits

1. <u>Ball Room:</u> This exhibit was mostly described as a fun place for children. It had very modest appeal for adults, but was a well-visited and popular exhibit for children. Only about half of the adults, and fewer children, grasped a reasonable understanding of a main point. About half of the adults participated in the activity.

2. <u>Float Table:</u> This exhibit is popular among adults (children were not asked specifically about this one). Most adults participated and almost all perceived a reasonable "main point." About half of the adults said they read the labels. This exhibit was perceived as encouraging creativity, but not so relevant to everyday life.

3. <u>Program a Robot:</u> Most adults who looked at this exhibit read some instructions, actively participated and were able to provide a reasonable "main point." In spite of this active engagement and understanding, adults gave low ratings. Only about one quarter of the children saw this exhibit, and those who did gave modest ratings.

4. <u>Tech Choices:</u> Adults participated in this activity, but they gave it very low ratings and only about half could provide a reasonable conception of the "main point." Most children did not see this exhibit.

5. <u>Oregon Inventors:</u> This exhibit received moderate ratings from adults (few highs and few lows). Most adults understood that it was about the invention process and saw it as relevant to everyday life. As a text and visual exhibit in a hall full of interactives, this could be viewed as a successful supplemental exhibit, providing context and relevance.

6. <u>Build an Aqueduct:</u> Although adults participated in this activity and understood it very well, they gave it low ratings. Less than half of children saw this exhibit, but those who did thought it was "great" or "good."

E.1. THE BALL ROOM

This summary of visitors' perceptions of the Inventors' Ball Room provides data on three topics: (a) adults' pattern of use, (b) the appeal of the activity, and (c) perceptions of the interpretive messages. This exhibit is unusual because it was also asked about in interviews with children (the 'photo board', method 2), and children's answers are included in sub-section 'c' about the "point" or main idea of this activity.

E.1.a. Pattern of Use

OVERVIEW: Adults' use of the Ball Room is quite varied. Some spend only a few minutes, but about 60% spend 10 or more minutes there. About half of the parents actively participate, and the other half watch. Almost half said they read labels or explanations.

How many minutes did you spend in the ball room? (n=44)

5 minutes or less	38%
~10 minutes	24%
15 or more	38%

Did you do the activity yourself or just watch others do it?

did the activity	52%
just watched others	48%

Did you read any labels or explanations?

yes	43%
no	57%

E.1.b. Appeal

OVERVIEW: Adults rated the Ball Room as only moderately interesting: half gave it a medium rating, and slightly more gave low ratings than high ratings. These are in line with the ratings for most of the other exhibits in the Tech Hall. Some adults were interested in the science behind the activity, while others were most interested by the action and the appeal for children. Visitors offered various suggestions for improvements: some suggested better instructions, while others wanted better mechanical functions.

How would you rate the activity on a scale from 1 to 10?

high (9-10)	20%
medium (7-8)	50%
low (1-6)	30%

What was most interesting about it?

27%	Mechanics/ movement/ air flow/ suction
27%	Interactive/ shooting targets
20%	Kept kids' attention
14%	Problem solving
9%	The balls
7%	Other
2%	Blank, nothing

What suggestions do you have for improving this exhibit? (n=44)

25%	Better instructions
20%	Improve ball return and handling
14%	More of everything
14%	Control overcrowding
11%	Staff to assist and control activities
7%	Other
11%	No suggestions, it's fine
18%	Don't know

E.1.c. Visitors' Perceptions of Interpretive Messages

OVERVIEW: Some children were able to identify a main point to the Ball Room and some of these answers reflected learning about or experimenting with air pressure. Other children made more elementary observations about trying to shoot balls or just have fun.

What was the main point of the activity? **[CHILDREN; n=108; method 2]**

	Reasonable answers
18%	See how air pressure works, air & gravity
17%	Inventing, designing, experimenting
9%	Learn about something (in general or air, putting tubes together, vacuum)

	Experiential answers
16%	Just playing, having fun (no point)
12%	Put balls in tubes, shoot balls, make them fly
8%	Try to shoot the balls into the nets

	Weak answers
9%	Other/unclear (throwing balls, how everything moves)
13%	Blank, don't know

Sample of answers: CHILDREN

Reasonable answers
Learn how to design air things
Learn about air and gravity
Show kids how air pressure works
For testing what balls can do & how you can invent a lot of stuff
Creative ways things can get from point A to point B
Use air pressure to make the balls go up
Learn about how things go through tubes

Experiential answers
See how you could put balls places and shoot them to the thing that empties
Try to connect tubes, aim balls toward targets
Learn to shoot balls out of cannons
Playing
It's really fun, no reason besides fun

Weak answers
I don't know how it works
Wind blows stuff, starts to move tornado
To see how everything can move in a different way
How they make balls
For little kids

E.1.c. Visitors' Perceptions of Interpretive Messages (continued)

OVERVIEW: About half of the adult visitors were able to identify some reasonable main point to this activity that reflected the content or principles of the Ball Room. About one-third perceived the Ball Room as merely a place to have fun.

What was the main idea or point of the activity? **[ADULTS; n=44; method 3]**

> 51%   <u>Reasonable answers (mentioned content or principles)</u>
> *Learning about physics*
> *Air pressure, observe what happens*
> *To discover how air currents work and the energy of that*
> *Learning how air flow makes things go*
> *Something to do with air, propels things*
>
> 35%   <u>Experiential answers (hands-on, having fun)</u>
> *For kids to experiment*
> *We just threw balls*
> *Play-based learning*
> *For kids to explore creativity, build imagination*
>
> 4%   <u>Weak answers (unclear understanding)</u>
> *Gravity*
> *Show gravity to have fun*
>
> 9%   Blank, don't know

Adults' Perceptions of Interpretive Messages (continued) | **BALL ROOM** |

OVERVIEW: Adults perceive the Ball Room as a place that encourages creativity, a place to play around, and an example that there is more than one way to do something. They are much less likely to perceive that it is relevant to everyday life. This exhibit is not intended to show that it's important to "follow the rules," and adults were fairly likely to understand that.

Do you think these phrases describe this exhibit?
Tell me definitely, somewhat, or not really?

	Definitely	Somewhat	Not Really
You can play around without caring which way works better	86%	11%	2%
Shows that there's more than one way to do things	84%	11%	5%
Encourages people to be creative	71%	25%	4%
Feels relevant to everyday life	16%	45%	39%
Shows that it's important to follow the rules	23%	29%	48%

E.2. FLOAT TABLE

This summary of visitors' perceptions of the Float Table provides data on three topics: (a) adults' pattern of use, (b) the appeal of the activity, and (c) perceptions of the interpretive messages.

E.2.a. Pattern of Use

OVERVIEW: The Float Table is an active experience for most visitors — almost all adults who spend time at the exhibit participate also. About half read the labels and explanations.

Did you do the activity yourself, *or just watch others do it?*	Adults (n=43)
did the activity	91%
just watched others	9%

Did you read any labels or explanations?	
yes	47%
no	53%

E.2.b. Appeal

<div style="border:1px solid black; display:inline-block">**FLOAT TABLE**</div>

OVERVIEW: The Float Table is the most appealing to adults of the six exhibits examined in this method. About half gave it high interest ratings and most of the rest gave it moderate ratings. Many people were interested in the mechanics and aerodynamics of how the activity works, while others emphasized the hands-on fun. Some visitors complained about the quality of the scissors, while others wanted either better instructions or visual instructions.

How would you rate the activity on a scale from 1 to 10?

high (9-10)	51%
medium (7-8)	37%
low (1-6)	12%

What was most interesting about it?

40%	Mechanics/ how it works/ manipulating cups
28%	Making something fly/ aerodynamics
14%	It's a hands-on activity
14%	Creative fun
9%	Watching other people
5%	Its simplicity
5%	Other

What suggestions do you have for improving this exhibit? (n=43)

23%	Better scissors
16%	Clearer instructions
14%	Structural design suggestions
14%	Visual explanations
12%	Better control of air speed
5%	More supplies (markers/crayons)
2%	Other
14%	No suggestions, it's fine
7%	Don't know

E.2.c. Adults' Perceptions of Interpretive Messages

<div style="float: right; border: 1px solid black; padding: 4px;">**FLOAT TABLE**</div>

OVERVIEW: The large majority of adults using the Float Table were able to identify a main point of the activity — primarily that a person could make a variety of shapes (of paper cups) that could achieve the purpose of lift/flying in the air flow.

What was the main point of the activity?   **[ADULTS; n=43; method 3]**

84%	<u>Reasonable answers (mentioned content or principles)</u>
	Learning how wind affects shape
	Whole idea of aerodynamics of objects
	Air flow, showing patterns
	Creativity and design, interaction with wind
	Seeing how things float with the movement of air
	How shape changes the way things move
14%	<u>Experiential answers (hands-on, having fun)</u>
	Stimulate creativity
	It's fun
	Creating a flyer yourself
2%	<u>Weak answers (unclear understanding)</u>

Adults' Perceptions of Interpretive Messages (continued)   FLOAT TABLE

OVERVIEW: Adults believe that the Float Table encourages creativity, allows people to play around, and demonstrates that there is more than one way to do things (also confirmed by a strong sense that this exhibit is not about following "the rules"). Many visitors, however, see little relevance to everyday life.

Do you think these phrases describe this exhibit?
Tell me definitely, somewhat, or not really?

	Definitely	Somewhat	Not Really
Encourages people to be creative	95%	5%	0%
Shows that there's more than one way to do things	93%	7%	0%
You can play around without caring which way works better	86%	12%	2%
Feels relevant to everyday life	21%	42%	37%
Shows that it's important to follow the rules	7%	23%	70%

E.3. PROGRAM A ROBOT

This summary of adults' perceptions of the Program a Robot exhibit provides data on three topics: (a) adults' pattern of use, (b) the appeal of the activity, and (c) perceptions of the interpretive messages.

E.3.a. Pattern of Use

OVERVIEW: Most adults who stop at Program a Robot engage in the activity while only about one-quarter just watch someone else. About 80% of adults read some of the labels or explanations, the highest among the six exhibits investigated.

Did you do the activity yourself,	Adults
or just watch others do it?	(n=43)
did the activity	74%
just watched others	26%

Did you read any labels or explanations?	
yes	81%
no	19%

E.3.b. Appeal

<div style="border: 1px solid black; display: inline-block;">**PROGRAM A ROBOT**</div>

OVERVIEW: Adults gave modest ratings to this exhibit, mostly medium, with more low than high ratings. The most interesting part to adults was the challenge of finding a successful strategy or logic. Almost half of the adults complained that the lighting (visual contrast) made the activity difficult to see properly.

How would you rate the activity on a scale from 1 to 10?

high (9-10)	21%
medium (7-8)	44%
low (1-6)	35%

What was most interesting about it?

47%	It's a strategy problem/ logic/ figuring it out
26%	Programming/ telling robot what to do
9%	It's interactive
7%	Seeing the results/ watching the robot do its program
5%	Don't understand/ didn't get it
5%	Other
2%	Blank, nothing

What suggestions do you have for improving this exhibit? (n=43)

44%	Make it easier to see/ not dark enough
21%	Better instructions
7%	Easier to maneuver
9%	More levels, options, commands
7%	Other
14%	No suggestions, it's fine
5%	Don't know

E.3.c. Adults' Perceptions of Interpretive Messages   PROGRAM A ROBOT

OVERVIEW: The large majority of adults were able to identify programming as the main point of the activity.

What was the main point of the activity? **[ADULTS; n=43; method 3]**

    79%   <u>Reasonable answers (mentioned content or principles)</u>
                  Human-computer interaction
                  Learning to program a computer
                  To learn complexity of programming a robot
                  To get a feel for programming
                  Program the robots to pick up the rock
                  Teach kids how to move, program, build programs into one button

     2%   <u>Experiential answers (hands-on, having fun)</u>
                  Hand-eye coordination

    12%   <u>Weak answers (unclear understanding)</u>
                  To see if you can build a robot
                  Something about moving a robot
                  To collect certain items

     5%   Blank/ don't know

Adults' Perceptions of Interpretive Messages | **PROGRAM A ROBOT** |

OVERVIEW: More than any of the other activities tested, Program a Robot elicited the perception that following the rules was important. At the same time, adults saw the latitude to play around and that there was more than one way to complete the mission. Most adults did not, however, see this as a creative activity or one that is relevant to everyday life.

Do you think these phrases describe this exhibit?
Tell me definitely, somewhat, or not really?

	Definitely	Somewhat	Not Really
Shows that there's more than one way to do things	79%	12%	9%
Shows that it's important to follow the rules	74%	12%	14%
You can play around without caring which way works better	58%	12%	30%
Encourages people to be creative	33%	29%	38%
Feels relevant to everyday life	30%	37%	33%

<div style="border:1px solid black; padding:5px;">

E.4. TECHNOLOGY CHOICES

</div>

This summary of visitors' perceptions of the Technology Choices computer game provides data on three topics: (a) adults' pattern of use, (b) the appeal of the activity, and (c) perceptions of the interpretive messages.
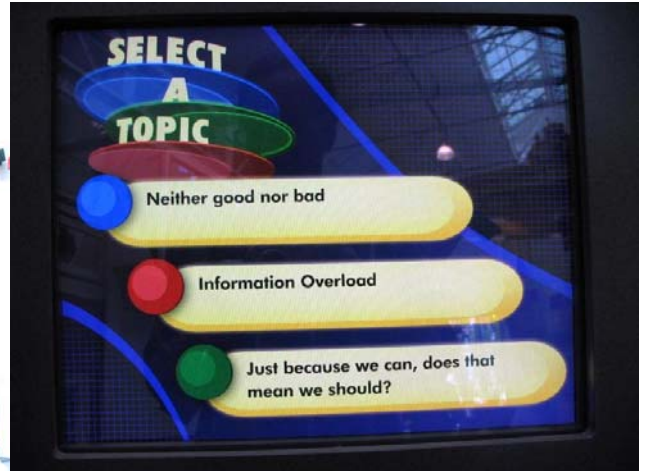
E.4.a. Pattern of Use

OVERVIEW: Almost all adults who spent any time looking at Technology Choices said they actively participated in answering the questions, rather than just watching others do it.

Did you do the activity yourself, or just watch others do it?	Adults (n=43)
did the activity	84%
just watched others	16%

E.4.b. Appeal

OVERVIEW: Adults gave this exhibit very modest ratings; most gave low or medium ratings, and very few gave high ratings. This lack of enthusiasm is also reflected in what they found most interesting about the exhibit: the facts and information.

How would you rate the activity on a scale from 1 to 10?

high (9-10)	16%
medium (7-8)	44%
low (1-6)	40%

What was most interesting about it?

47%	Facts/information/statistics
21%	Other people's opinions
16%	The questions
9%	Hands-on/game-like
5%	Learning
5%	Specific topics (cell phones, diapers, pigs)
2%	Other
7%	Blank, nothing

What suggestions do you have for improving this exhibit? (n=43)

16%	More questions
16%	Instructions for controls
9%	Use more colors, sounds, images
9%	Make questions accessible for children
7%	Less reading
16%	Other
9%	No suggestions, it's fine
19%	Don't know

E.4.c. Adults' Perceptions of Interpretive Messages

<div style="border:1px solid black; text-align:center;">
TECHNOLOGY CHOICES
</div>

OVERVIEW: About half of the adults identified the main point of Technology Choices as being about making choices regarding technologies that have impacts on society. Most other adults perceived it as just gaining knowledge or seeing other people's opinions.

What was the main point of the activity? **[ADULTS; n=43; method 3]**

51%   Reasonable answers (mentioned content or principles)
        So you understand other people's opinions on issues
        Make you aware of various technologies and how they affect you
        How technology changes the world, the choices we make
        Help you stop and think about things we take for granted

40%   Educational /general knowledge
        Knowledge about science
        Teachable and helpful information
        Makes you think outside the box
        To get people's point of view

7%   Weak answers (unclear understanding)
        To figure out how to use it
        The environment
        Test your knowledge

2%   Blank/ don't know

Adults' Perceptions of Interpretive Messages (continued)

<div style="border:1px solid black; display:inline-block;">

**TECHNOLOGY
CHOICES**

</div>

OVERVIEW: Almost all adults did see the relevance of this exhibit to everyday life and most thought it showed that there is more than one way to do things. Few adults saw any latitude for creativity here, which was not an objective for this exhibit.

Do you think these phrases describe this exhibit?
Tell me definitely, somewhat, or not really?

	Definitely	Somewhat	Not Really
Feels relevant to everyday life	70%	26%	5%
Shows that there's more than one way to do things	51%	21%	28%
Encourages people to be creative	0%	39%	61%

E.5. OREGON INVENTORS

This summary of visitors' perceptions of the Oregon Inventors exhibit provides data on two topics: (a) the appeal of the exhibit and (b) perceptions of the interpretive messages.

Information about adults' patterns of use was limited to whether they were observed to look at more than one of the four panels. Although about half of the adults interviewed did look at more than one panel, this is very likely to underestimate the actual pattern of use since this research method did not include observing visitors for their entire period of looking at or using an exhibit. (The method set a criterion of at least 10 seconds of observed use in order to interview an adult about the exhibit; most of the time, the observed use was considerably longer than that as interviewers waited for the person to finish their experience of the exhibit. 'Observed use' would of course be shorter than actual use.)

OREGON INVENTORS

E.5.a. Appeal

OVERVIEW: Adults gave Oregon Inventors decidedly moderate ratings, although moderate ratings may indicate a successful exhibit in the context of a hall with many interactives. This perspective may be further justified by the types of things people found most interesting: the process of invention, ideas and inventions created by everyday people and the local connections. The most common suggestion for improving this exhibit was to make it more interactive.

How would you rate the activity on a scale from 1 to 10?

	Adults (n=43)
high (9-10)	23%
medium (7-8)	54%
low (1-6)	23%

What was most interesting about it?

30%	Process of invention
21%	Ideas/ everyday things by average people
16%	Local connections
16%	Waffle iron story
14%	Leatherman story
12%	Presentation/ images
2%	Inspiration to invent
14%	Other

What suggestions do you have for improving this exhibit? (n=43)

30%	Make it interactive/ tangible items to try
16%	More details
14%	Use more color, images, video
9%	Make it more kid-friendly
9%	Other
16%	No suggestions, it's fine
12%	Don't know

E.5.b. Adults' Perceptions of Interpretive Messages

OVERVIEW: Most adults were able to give reasonable answers about the main point of this exhibit, identifying the invention process: creativity, everyday people inspired by practical needs.

What was the main point of the activity? [ADULTS; n=43; method 3]

74%   Reasonable answers (mentioned invention process)
How invention works from beginning to end
Creativeness to create an invention
The process of invention
How people get inspired by practical needs
You don't have to be a scientist to be an inventor
Inventions take a lot of time, you have to be patient

12%   General knowledge (mentioned history, learning)
Gives you information on an invention
To show history

12%   Weak answers (unclear understanding)
Inform people about stuff around here
To show things have changed

2%   Blank/ don't know

Adults' Perceptions of Interpretive messages (continued)

OVERVIEW: Oregon Inventors conveyed many of the same messages as the other exhibits by using illustrative stories rather than interactive demonstrations. It was successful in illustrating that there's more than one way to do things, and visitors saw the relevance to everyday life. They also thought the stories encouraged people to be creative.

Do you think these phrases describe this exhibit?
Tell me definitely, somewhat, or not really?

	Definitely	Somewhat	Not Really
Shows that there's more than one way to do things	86%	9%	5%
Feels relevant to everyday life	72%	19%	9%
Encourages people to be creative	67%	28%	5%
You can play around without caring which way works better	35%	26%	39%
Shows that it's important to follow the rules	9%	16%	74%

E.6. BUILD AN AQUEDUCT

This summary of visitors' perceptions of the Aqueduct exhibit provides data on three topics: (a) adults' pattern of use, (b) the appeal of the activity, and (c) perceptions of the interpretive messages.

E.6.a. Pattern of Use

OVERVIEW: Although most of the adults who stopped at the Build an Aqueduct activity did participate in it, a substantial portion (37%) did not. Only about half read any labels or explanations.

Did you do the activity yourself, *or just watch others do it?*	Adults (n=43)
did the activity	63%
just watched others	37%

Did you read any labels or explanations?	
yes	58%
no	42%

E.6.b. Appeal

<div style="border:1px solid black; display:inline-block">**AQUEDUCT**</div>

OVERVIEW: Adults gave Build an Aqueduct relatively low ratings as an experience; only a few people gave it high ratings, and about half gave it low ratings. Although most adults were able to identify something that was "most interesting," the low ratings suggest that not much was actually interesting. The most frequent suggestions for changing this exhibit were to add more things to do with the water (pipes, ramps) and to clarify the instructions/explanations.

How would you rate the activity on a scale from 1 to 10?

high (9-10)	7%
medium (7-8)	42%
low (1-6)	51%

What was most interesting about it?

35%	Mechanics/ how to get water from point to point
23%	Thinking challenge of how to make it work
14%	Movement of water
12%	How it relates to the larger world
12%	Adjusting/various ways to make it work
12%	Building/creating
5%	Other

What suggestions do you have for improving this exhibit? (n=43)

35%	Make water do more/ more ramps, pipes, props
19%	Better instructions
16%	Include visual explanations
14%	Make it easier to operate
9%	Make it more kid-friendly
7%	Other
5%	No suggestions, it's fine
12%	Don't know

E.6.c. Adults' Perceptions of Interpretive Messages

AQUEDUCT

OVERVIEW: Almost all adults were able to identify that the point of the exhibit was transporting water from one place to another in one form or another.

What was the main point of the activity? **[ADULTS; n=43; method 3]**

> 95%   Reasonable answers (mentioned use or transportation of water)
> *See how you get water from a source to where you need to use it*
> *How some city water systems work*
> *Principle of using water for power and transporting the water*
> *Explaining irrigation to children*
> *To use water wisely, that we can use water for producing power*
> *How to take water from one place to the next*
> *Show how to move water for agriculture*
> *Technology of transporting water in third world countries*
> *Show how water gets from the natural source to the house*
>
> 2%   Experiential answers
> *Shows kids functions of that thing and entertain kids*
>
> 2%   Weak answers (unclear understanding)
> *Move water around*

Adults' Perceptions of Interpretive Messages (continued)

OVERVIEW: Even though most adults gave this exhibit low ratings, they seemed to recognize several of the objectives. Adult visitors agreed that it demonstrated there's more than one way to do things, it encourages people to be creative, and lets people play around without caring which way works better. About half thought it was relevant to everyday life. Few adults thought it demonstrated the importance of following the rules, which is an ambiguous idea in this context

Do you think these phrases describe this exhibit?
Tell me definitely, somewhat, or not really?

	Definitely	Somewhat	Not Really
Shows that there's more than one way to do things	88%	12%	0%
Encourages people to be creative	72%	19%	9%
You can play around without caring which way works better	70%	26%	5%
Feels relevant to everyday life	53%	28%	19%
Shows that it's important to follow the rules	19%	30%	51%

F. Characteristics of the Samples

This section describes the characteristics of the people interviewed using the three methods: adults and children exiting Turbine Hall and adults interviewed at six individual exhibits. The key results are:

♦ Most of the people interviewed were repeat visitors (70%+) and the vast majority of visitor groups included children (89%).

♦ Most of the adults were in their 30s or 40s, and there were slightly more women than men.

♦ Among the children who were interviewed, there were slightly more children in the younger age group (8-10) than were in the older age group (11-14).

F. Characteristics of the Samples

METHOD 1: A sample of 358 visitor groups was contacted during the spring of 2005 as they were leaving Turbine Hall. These were primarily repeat visitors to OMSI (69%+) and the vast majority (89%) of groups included children under age 18. Most of the adults interviewed were in the 30-49 age range and there were slightly more women than men. If the visitor group included children in the target age range (8-14), some of the interview questions were directed to the child. This sub-sample includes a good mix of children within the age range, and there were fairly equal proportions of girls and boys interviewed.[7]

METHOD 2: The sample of 150 children interviewed when exiting Turbine Hall was designed to consist of equal numbers of boys and girls and also included a similar age distribution to the Method 1 sample.

METHOD 3: A sample of 259 adults was interviewed after stopping at one of the six exhibits selected for an in-depth evaluation (~43 visitors at each element). The characteristics of these visitors are similar to the other samples in that the majority were repeat visitors (but fewer members), 89% of the adults were visiting with children (mostly school-aged), and 60% were women.

	Method 1 Adult/Child Interviews (n=358)	Method 2 Child Interviews (n=150)	Method 3 Adult Exhibit Interviews (n=259)
Familiarity with OMSI:			
first-time visitors	18%	24%	30%
repeat visitors	69%	76%	70%
mixed group (both 1st-time & repeat)	12%		
OMSI members	40%		10%
Group size:			
one	2%	0%	1%
two	27%	18%	19%
three	24%	37%	21%
four	28%	17%	26%
five or more	19%	29%	33%
Group composition:			
adults only	11%	0%	11%
family with children	89%	100%	89%
Age group of children:			
preschoolers only	27%	0%	12%
preschoolers and school-age	23%	23%	26%
school-age only	39%	77%	62%

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[7] Originally there were not enough girls in the sample to conduct thorough analyses, so data collection continued, focusing on girls in the target age range. This stratified random sample is not necessarily an accurate representation of "who visits Turbine Hall."

Characteristics of the Samples (continued)

	Method 1 Adult/Child Interviews (n=358)	Method 2 Child Interviews (n=150)	Method 3 Adult Exhibit Interviews (n=259)
Gender of adult interviewed:			
male	44%		40%
female	56%		60%
Age of adult interviewed:			
18-29	18%		16%
30s	38%		26%
40s	27%		33%
50s	7%		14%
60+	10%		11%
Occupation of adult:			
technology jobs	20%		8%
professional/intellectual jobs	35%		22%
other types of jobs	45%		69%

Sub-sample of kids who were interviewed:

	Kids (n=140)	Child interviews (n=150)
Age of child interviewed:		
8-10	59%	57%
11-14	41%	43%
Gender of child interviewed:		
boy	46%	50%
girl	54%	50%