

The Exploratorium

Introduction

Cathy, Tacy, and John observed the Exploratorium, a hands-on science museum in San Francisco that focuses on learning more about the world around us. The museum is an open warehouse with, few walls, and is inviting to the visitor. The lack of physical barriers seems to encourage exploration within and among the many themed exhibits. On the other hand, the lack of bright lighting makes the Exploratorium seem dark, old, and even a little mysterious. The first floor had many new exhibits, including the new attraction, *Behind the Screen*. Although there were other popular exhibits, we will focus on an animation exhibit because of its learning success and to design a complementary exhibit to enhance the experience for the visitor.

Methodology

The three of us spent over an hour and a half at the Exploratorium on a Sunday afternoon from 11:30 – 1:15. We walked around, experimented with the exhibits, and took field notes at the same time. We started on the second floor with the Sound exhibit and ended up in the Electricity exhibit. We noticed that there were not many people going through these exhibits and decided to go down stairs. There were many more people on the first floor. The exhibits included Water, Air, and the new exhibit *Behind the Screen*. The first popular exhibit that we came across was a huge bubble-making machine that could potentially make five feet by five feet bubbles. This was a huge hit for both children and adults. We spent a few minutes observing how children and adults interacted and then continued to move forward.

Other exhibits included a simulated water geyser, and exhibits on the flow of air, and motion. Another exhibit was a marble exhibit popular with young children. Tacy spent an additional half an hour observing a group of children throwing marbles onto a circular table that was shaped into a funnel and watched the marbles roll around and around until they reached the center. The marbles then fell into a container on the ground. Children experimented by throwing handfuls of marbles at the center or rolling them one by one in different patterns. Adults stood at the periphery and mainly played an encouraging role, “it’s okay, you can throw it now.” This exhibit was extremely popular as some children stayed for more than twenty minutes.

We continued to move along and saw the new exhibit, *Behind the Screen*. This exhibit focuses on movies, animation, and television. The animation exhibit was one of the first people experienced in the *Behind the Screen* special exhibit. It was extremely busy as both children and adults created animations. As we took notes, we began to feel awkward because every time a person did something interesting, we would begin writing in our notepads. This was the last major exhibit we observed due to time constraints.

Animation Exhibit Description

The exhibit begins with a computer-displayed presentation on the history, art, and science of animation. The five-minute presentation on the illusion of motion is shown on two individual (approximately 15-inch) flat-screen monitors. The activity provides little interaction with visitors, only prompting the user to click to continue. The exhibit path then leads to an animation station where four computer workstations are set up to allow visitors to create their own animated sequences. The exhibit's learning goal is for visitors to understand that "a succession of still images can produce the appearance of motion". A poster above the workstations shows static pictures of the popular animated cartoons South Park, the Simpsons, Mickey Mouse, and Beavis and Butthead, in addition to a large picture of an artist drawing frames.

The Station:

- 4 computer screens in a row
- 4 stools
- A flat work surface in front of each computer screen.
- A camera placed directly above each work surface.
- A choice of props: background scenes (a plain black background, and a room) and objects (Curious George in three parts, a ball, a plane, a bird, a magician, a frog, etc.).
- Four brightly colored buttons on the vertical surface of the table:
 - Start – gives the visitor brief instructions on how to create an animation
 - Record – takes a snapshot of the current scene
 - Erase – deletes the current frame
 - Playback – plays the user's frames together in a sequence

The Screen:

- In the upper right hand corner is a small box with the number of frames and the time it will take to replay the animation. (17 frames; 1.7 seconds)
- The center of the screen shows what is framed by the camera.
- There is a strip at the bottom which shows thumbnails of the last ten or so frames.
- Encouraging messages appear at the bottom of the screen during the process of animation.
- Once animation has been played back, a message flashes at the bottom of the screen, "You have 20 seconds left to complete your animation." While this invites users to edit their work, we never saw anyone do anything other than replay their animation.

- Sessions are timed and once that time is up, the entire screen changes to display only this text, “If others are waiting, please give the next person a turn.” Both children and adults obeyed this directive though on several occasions, people would slide to another space and begin again.

Observations

Unintentional and Intentional Modeling

A few minutes after we arrived at the animation station, an “Explainer” a museum guide in his late teens, jumped at the opportunity to make his own animation when he saw an empty seat in front of one of the workstations. Without asking if visitors needed help or guidance, he immediately went to work putting together an animation of a rolling red wagon knocking down Curious George with such “force” that Curious George’s head fell off. He quickly moved the props, hitting the Record button each time he wanted to record a frame, and pressing the Playback button to show off his animation to the two other amused Explainers standing nearby. The Explainers had been walking around together as a group and appeared to be friends. When the Explainer was done, he and his friends left the exhibit area.

Sitting to the right of the Explainer was an approximately 7-year-old girl who, after watching the Explainer’s animation, began animating a sequence of her own. She moved the props in a sequential manner, pressing the record button every time she wanted to record a frame. In her story a large frog jumped and landed on top of Curious George’s head. Once again the friendly monkey lost his head. After playing the animation and excitedly showing her mom, who was making her own animation in the next seat, the girl made two iterations of the same movie, improving upon the first by making it appear as though the frog was biting off Curious George’s head. Each time, she eagerly asked her mom to look at her new animation.

Although the Explainer’s job is to assist visitors and help them to use the exhibits, it appears that the modeling that was taking place was unintentional. The Explainer was having fun with his friends, and in the process was showing young visitors the correct sequence of actions to take to create an animation. The girl sitting next to him was able to pick up on this right away after watching him, and even imitated the content of the animation.

After this particular group of visitors left, a young girl, approximately 4 or 5 years old, sat on her dad’s lap at one of the computer stations. She began playing with the props, but did not understand she was supposed to press the record button. Her dad began arranging the props and recording scenes. The

girl stopped playing with the pieces and watched her dad for a few minutes until she got restless and moved to her own station. She again moved the props around, but this time was able to record each frame. Her dad, who was watching her carefully, then moved over to her station and took over, moving the props and hitting the buttons for her.

At first the young girl was having fun simply playing with the props, unaware that she could create an animation by moving the pieces in succession and hitting the Record button. The subsequent scaffolding from her dad helped her to understand what she could do. Although she was successful at starting an animation of her own when the scaffolding faded, her dad's intervention prevented her from using and showing these newly gained skills.

Experimentation

An approximately 11-year-old year girl sat down and began recording. She started with the props and then discovered she could photograph her hand. She moved it around on the table and then began moving it up towards the camera and back down towards the table. As she did this, she rapidly pressed the record button with her other hand until she had taken 100 frames. Once she had finished, she turned to her younger sister to ask her to watch what she had created.

While the older girl seemed familiar with the basic concepts of animation, she experimented and discovered new possibilities such as recording her hand and moving her hand toward the camera. No one else had recorded as quickly as she did during the time we observed these stations, but perhaps she discovered this on her own or had done this activity before and witnessed a broader range of possibilities.

Too young?

A young boy, perhaps 3 years old, and his family approached the station. His parents sat at one station and began to experiment. He had a clear plastic lizard in his hand which he began to hold in front of the colored buttons seeming to look at the color through the body of this lizard. His parents were engaged with the animation and occasionally would try to involve him but did not seem to notice that his main interest was this plastic lizard and the different colored buttons. He was the youngest boy we saw at this station and seemed to have chosen an appropriate activity given his interests and abilities. He was too short to reach the animation stage without kneeling or standing on the stool. The written directions were meaningless for him. This type of interaction was sophisticated and would have required help and mediation by an adult or older child.

Collaboration

The screens are all in a row, inviting visitors to look over the animators' shoulders and to see their neighbors' work. Children encourage this by calling for an audience when they have finished. Cries of "Mom, look!" and "Come see!" rang out often as children played back their animation.

Often creating animation itself was a joint activity with a parent explaining and modeling how to create animation. One father and his approximately 6-year-old daughter sat together. She moved the objects around while he pressed the buttons. Another mother crouched next to her 5+ year-old daughter and watched her daughter record two frames and press playback. The animation was disappointingly short and the mother said, "You have to do more. You know what you do: Press record and move things just a little bit." The mother then demonstrated by moving the objects while the girl pressed record for several frames of animation.

Two girls between 9 and 11 worked together to create an animation of their hands. One was responsible for pushing the record button and placed her other hand in the animation; the other girl used both hands as part of the animation. They moved their hands a great deal and "played" with and in response to each other. One would start a new movement and the other would imitate it or begin yet another new movement. The girl pushing the record button captured some of the movements but often the girls seem most interested in the interaction of their hands and seeing it on a computer screen. They did not push the playback button at the end.

Single vs. Group Experience

A teenage boy began to make his own animation of an airplane moving in from the right side of the screen very slowly. He began to hit the record button rapidly barely moving the plane at all and then erased the entire thing, never playing back the animation. After only a few minutes at the station he got up and moved on to the next exhibit about video cameras. He did not seem to be in a group, and had no audience to share his potential creation with. Contrasting this view, another reason why he may have been reluctant to develop his animation is that creation can be a very personal thing and the public openness of the exhibit would allow an audience of strangers to see what he had created, making him feel uncomfortable.

All the other visitors we saw at the animation station were part of groups and seemed to enjoy sharing their creation with the other members of their party. In most cases groups consisted of parents

and children, or small groups of children but at least one was entirely of adults. The three middle-aged participants collaborated on an animation, each taking turns moving the props and giving suggestions. They seemed to be enjoying themselves, laughing and smiling the entire time. Without the presence and participation of all three participants, the experience would have been very different for each of them, and perhaps less satisfying.

Analysis

A number of design features of the exhibit provided an entertaining, educational opportunity for most visitors. The physical set up of the stations allowed participants to see each other's screens, therefore encouraging modeling, sharing, and collaboration between participants. Although the exhibit can be enjoyed by a single visitor, groups of visitors seemed to gain the most enjoyment in working together and showing off to each other.

The usability design of the workstations allowed even young children (5 years and older) to create animations. Often young children had some initial guidance from a parent or older sibling, but were then able to perform the appropriate actions on their own, or with minimal help. The flexibility of the exhibit design also encouraged exploration and experimentation with the props and camera.

Both children and adults appeared to enjoy the exhibit and most stayed to create two or more animations. Overall, we believe the exhibit successfully met its goal of engaging visitors in creating frame-by-frame animations, and gaining an understanding of the idea that the illusion of motion can be created through a succession of still images.

Sound Machine

While the animation exhibit was highly successful, there was no immediately intuitive way to build on this knowledge in the larger exhibit. The surrounding stations were configured differently and did not make obvious connections to this initial station. We propose to place another exhibit immediately next to this station to explore a related dimension of animation: the evocative, humorous and creative use of sound and voices as linked to visual images. By creating a sister exhibit to complement a strong existing exhibit, we hope to enrich the overall learning experience.

This new station would resemble the animation station in terms of its appearance, the interaction it affords, and the topics addressed. By replicating the stools, the location of the directions, the computer screens, and large colored buttons, our exhibit would aim to attract users from the neighboring exhibit or alternatively to prepare them for it. A large poster would show animation frames making obvious references to sound: an anvil landing, a speeding train, Maggie Simpson squeezing a horn and a large picture of people in a recording studio. Placing these stations next to each other would allow observers to see both stations and make obvious connections.

The Station:

- 4 computer screens in a row each with a different animation
- 4 stools
- 4 unidirectional microphones and headphones
- 4 colored buttons at the bottom of the table: Start, Record, Erase, and Playback

The Screen:

- Along the right side would be a long box with a list of sounds and the length of each sound.
- A large box near the center of the screen would show the animation.
- Three strips along the bottom would show thumbnails of the last twenty frames, a voice track and a sound track.
- A vertical tracking bar stretching over the three strips at the bottom would indicate progress through the animation
- Encouraging messages would appear on the screen from time to time.
- Once animation has played back, a message would flash at the bottom of the screen, “You have 20 seconds left to complete your recording.”
- After the set time is up, the entire screen would change to display only this text, “If others are waiting, please give the next person a turn.”

This station would allow users to explore the interaction between sounds and visual images. After pressing the large Start button, users would watch a brief animation clip of about 15 seconds without sound. The visual track would show the moving animation frames. At the end of the preview, they would see “The End” and a musical sound would fly down from the list of sounds into the sound track at the bottom to model the way users can add sound to animation. Then they can choose and add sounds by dragging sound files into the sound track or recording sound themselves using two of the colored buttons at the bottom of the table: Record and Erase. Once in the sound track, each file would appear as a colored rectangle reflecting its length and relationship to the visual track. Users would navigate through the animation by dragging the vertical tracking bar back and forth.

Activities:

- choose music
- record voices
- add pre-recorded sounds effects

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- play back what they have created

Learning Goals:

- recognize the role of sound in animation
- explore the power of their voices
- play with mood and tone
- understand more about the process of creating animation