What Research Says... #17

Designing Exhibits That Motivate

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Most of us would agree that people visit museums because they are intrinsically motivated to do so. In other words, with few exceptions, people are not forced to go to museums by outside pressures; the motivation comes from within.

If we can determine the characteristics of an intrinsically motivating visitor experience (i.e., one which people enjoy and to which they want to return), we can selectively and consciously try to incorporate some of these characteristics as we develop and design new exhibits.

This article will address two important questions:

- What are the components of an intrinsically motivating museum exhibit experience?
- How do we design such an exhibit?

A large body of research that has been conducted in related fields (e.g., instructional technology, cognitive science, educational psychology) can guide some of the decisions that continually confront us. This scientific knowledge, coupled with lessons drawn from experience, can produce a powerful exhibit design and ultimately a satisfying and rewarding visitor experience.

Malone[1] analyzed popular educational computer games to determine why they were so popular. Individual components identified by this analysis were selectively and incrementally removed from computer games to determine their impact on game popularity. Malone and Lepper[2] continued this series of research studies, culminating in "Taxonomy of Intrinsic Motivations for Learning" and a set of "Heuristics for Designing Intrinsically Motivating Instructional Environments." Their research highlighted seven key variables: challenge, curiosity, control, fantasy, cooperation, competition, and recognition.

In 1978, Fleming and Levie completed an extensive review of behavioral science research.[3] Examining the fields of perception, memory, concept formation, and attitude change, they identified nearly 200 principles related to the design of effective instructional messages (messages that attract attention, enhance learning and remembering, enhance concept formation, and affect attitude change).

Perry[4] applied insights from this body of research to the development of a model for the design of intrinsically motivating exhibits. During the course of this two-year project at The Children's Museum of Indianapolis, Perry systematically modified an exhibit to incorporate the seven components identified by Malone and Lepper,[2] as well as many of the principles outlined by Fleming and Levie.[3] Visitors who used the exhibit were observed and interviewed. Three types of visitor interactions were identified and recorded ("artifact," "social," and "learning" interactions). Post-exhibit interviews measured both affective and cognitive outcomes.

The exhibit that emerged as these components were introduced and tested was significantly more effective than it had been originally. Moreover, the model itself changed to reflect the character of the museum environment and the results of the research itself. Further testing of the Perry model is currently underway at SciTrek in Atlanta.

The Model

Perry's research identified six components of an intrinsically motivating museum experience:

Curiosity—The visitor is surprised and intrigued.

Confidence—The visitor has a sense of competence.

Challenge—The visitor perceives that there is something to work toward.

Control—The visitor has a sense of self-determination and control.

Play—The visitor experiences sensory enjoyment and playfulness.

Communication—The visitor engages in meaningful social interaction.

This research suggests that these six components should be considered when designing museum exhibits. Obviously, not all exhibits need to include all six components, nor are these components completely independent of one another; there is much overlap and interaction among the categories. This model

At The Color Connection, visitors using the computer program would read a question on the screen, and its answer on the next. Searching for hidden information sparked and sustained visitors' attention.

is not a recipe for an effective exhibit. To be applied successfully, this model must be part of an exhibit development process that includes formative evaluation and prototype testing. This model can provide experienced exhibit developers and designers with a set of specifics to think about as they engage in the creative design process. It can give developers and designers an initial framework, and maximize the potential for a successful exhibit.

How do we design an exhibit that takes advantage of this model? The examples given here are a selective compilation based on the application of this model to just one exhibit.

The exhibit from which the following examples are drawn is one that should be familiar to most science museum professionals. At *The Color Connection: Mixing Colored Lights*, colored lights overlap to make white light. In this particular version, a red, a blue, and a green spotlight hang over a white tabletop equidistantly, projecting overlapping circles of color. Where the red and blue mix, the over-

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lap is magenta; the blue and green mix to make cyan; and the red and green form yellow. In the center of the overlapping circles is a large white area. This four-sided exhibit may be approached from any direction, and labels are mounted on each side. A computer mounted next to the table displays a menu of six options from which the visitor can choose. Next to the computer, a small wooden box with three color-coded switches lets visitors turn the colored lights on and off.

According to the model described here, there are six important questions that an exhibit developer might ask.

How will I pique the visitor's curiosity? At *The Color Connection*, visitor curiosity was first sparked by the brightly colored lights shining on the tabletop. After their attention was attracted, we kept them interested by posing a number of questions whose answers were not immediately available. For example, visitors using the computer program would read a question on one screen, and its answer on the next. This "search" for hidden information sustained their attention in small, easy-to-manage chunks.

How will I instill in them a sense of confidence? The problem with presenting questions is that such questions can make visitors feel inadequate. Visitors are more likely to pursue activities when they believe they will be successful and won't be made to feel stupid. Museum visitors are easily intimidated and often made to feel that there is something wrong with them when they don't understand an exhibit. This inhibits both their enjoyment and their learning.

At *The Color Connection*, we promoted a sense of confidence by composing the text at a very low reading level (about fourth grade). Visitors could quickly see that they would be able to understand the exhibit. By observing visitors and what they did at the exhibit, we found that the majority engaged in some sort of explaining or teaching behavior with other members of their social group. Both Diamond[5] and McManus[6,7] have observed similar phenomena.

We wanted visitors to feel that they could come up to the exhibit and immediately and successfully interpret something about the exhibit to someone else. The labels specifically encouraged this: "Look up! Find the colored lights." "How many lights are there? There are three, a red, a blue, and a green." It should be noted that these labels were written for adults, not children. It's usually the adults who read the labels; the children were having fun playing in the lights. Typically, adults accompanied by children are not trying to increase their own scientific literacy; they are looking for things they can tell their children to do, or to pay attention to. Many parents commented that they felt successful when they were able to explain things quickly.

How will I challenge the visitor? The sense of "I can do it" must be balanced by a sense of challenge. If success comes too easily—if the exhibit seems "babyish" or "boring"—the visitor will walk away. On the other hand, if the visitor perceives that he or she will not be able to succeed, if the exhibit seems uninteresting or "too scientific," the visitor will walk away. Balancing confidence and challenge in a exhibit can be a tricky business.

At *The Color Connection*, challenge came from a number of sources. One particularly effective label displayed drawings of shadow figures as it asked the visitor, "Can you make these hand shadows?" Similarly, one unit of the computer program encouraged them to make specific colors by turning the lights on and off.

How will I promote feelings of self-determination and control? Museums are "free choice" environments. However, given too many choices, the visitor may feel overwhelmed, or not make choices that lead to full enjoyment of an exhibit. As exhibit developers and designers, we can design exhibits that promote feelings of self-determination and control while simultaneously enhancing the exhibit's educational goals.

At *The Color Connection*, we initially gave visitors too much control by allowing them to turn the lights on and off by pushing large colored buttons. We quickly found that some visitors would sit for long periods of time punching the buttons and putting on light shows. This activity detracted from the visitors' overall experience. When the buttons were replaced by light switches, visitors still experienced control, but in a way that did not detract from their enjoyment and learning.

How will I promote feelings of sensory enjoyment and playfulness? Most visitors (and perhaps exhibit designers) are unaware that often the first step in learning from an exhibit is to have a playful experience with an object or phenomenon. Sometimes visitors are inhibited and not sure what to do, or what kind of behavior to encourage in their children. Exhibits should include opportunities for simple, playful activities, and enjoyment on a purely sensory level.

The Color Connection provided at least two play opportunities. A computer unit entitled "What Can I Do With My Preschooler?" encouraged visitors to take time to play in the lights and suggested to parents that children could crawl through the lights, put different objects in the lights, or make up stories about the hand shadows. The labels described above encouraged all visitors to make hand shadows.

How will I stimulate meaningful social interaction? Other research conducted in museums suggests that many visitors learn in museums through the social interaction that occurs during their visit.[5,6,7] Social interaction is often a primary reason for visiting a museum in the first place.[8] At the same time, however, many visitors engage in social interaction that is counterproductive to both the educational and enjoyment goals of the exhibit.

As described above, visitors spend much of their visit "teaching" one another. One of the most powerful components of *The Color Connection* exhibit was a computer unit that modeled successful teaching behavior. It carefully guided a pair of visitors (one as teacher, one as learner) through a series of short tasks designed to help both visitors acquire a basic understanding of the exhibit.

Although this model is still being tested and refined, it suggests exhibit features that may enhance the effectiveness of science museum exhibits. It should challenge us to think more consciously about how to design exhibits that are both entertaining and educational. However, the true test of any exhibit design still rests with the visitor. Asking these questions cannot replace testing our exhibit ideas with visitors, but it may make that process even more useful and effective.

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