

# Using Evaluation to Guide the Development of Behavior Change Programs

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Design and interpretation of exhibits focusing on the natural environment have changed in recent years. Zoos and museums have increasingly begun to place greater emphasis on the uniqueness of natural areas and on what visitors can do to preserve these ecosystems (Rabb, 1994). As part of its own commitment to conservation, Brookfield Zoo is looking at how to encourage visitors to think more about the relationship between people, their actions, and the environment.

The traditional approach to teaching about the environment is to focus on the knowledge or messages we want to share. The belief is that if we provide people with information, this will lead to a change in attitudes, which will eventually translate into a change in behavior (see Figure 1.1) (Ramsey and Rickson, 1977).

Brookfield Zoo has decided to take a more proactive approach and place greater emphasis on the behavior outcomes of its exhibits. By focusing on behavior change as an objective, we can then work backwards to decide what information to include and what attitudes to target in order to accomplish these objectives. Achieving behavior change is not easy. The relationships between knowledge, attitude, and behavior are, unfortunately, not as simple as the causal, linear association shown in Figure 1.1 might suggest (e.g., see Ajzen and Fishbein, 1977; Hines, et al., 1986-87). However, theory about human nature and evaluation techniques, such as front-end and formative evaluation, can help shape and refine the design of exhibits focusing on behavior change.

Brookfield Zoo is presently developing an outdoor adventure game called the Quest to Save the Earth. The Quest consists of a series of challenges focusing on the choices that humans make and the impact these choices have on the

environment. Each activity encourages visitor groups to work cooperatively to solve the challenge. The overall goals for this outdoor exhibit are twofold. Ideally, we want visitors to leave knowing they are making choices in their lives and that these choices have an impact on the environment. We also want visitors to leave with a greater likelihood of doing a new conservation behavior.

The first challenge found in the Quest to Save the Earth is called the Bog of Habits (see Figure 1.2). In this activity, visitors encounter an imaginary bog filled with stones. The stones represent different human behaviors or choices that can impact the environment. For example, recycling, driving a car, taking a vacation. Guidelines telling individuals how to work as a group to make their way across the Bog of Habits are located at the edge of the Bog. One member of each group plays the role of guide or facilitator, providing information to the travelers, those individuals who are crossing the Bog. As travelers select different conservation behaviors, the guide reads about the environmental impact of the selected choice from the Stepping Stone Book.

### **The Design Process**

When designing the Bog of Habits, we faced several questions. First, we wanted to avoid telling visitors what they should or should not be doing. Second, and related to this first issue, we wanted visitors to feel good about conservation behaviors they might already be integrating into their lives. Third, keeping in mind our objective to encourage modification of behaviors, we did not want to discourage people from engaging in environmentally friendly behaviors by making them feel guilty. In other words, we wanted visitors to explore and consider the merits of the conservation behaviors they were doing as well as their potential impacts. Fourth, and ultimately, we wanted visitors to consider modifying their behavior.

To shape the activity, we drew upon theory from a variety of different disciplines, including Conservation Behavior, Environmental Psychology, and Environmental Education. We used the concept of a "preferred environment" as our framework for shaping the design of the Bog of Habits. A preferred environment is one that would create a sense of competence in a visitor and has the following features: one is able to "make sense" of it; it offers novelty, challenge and uncertainty, and it permits choice (Kaplan, R. and Kaplan, S., 1982; Kaplan, S., 1973).

The concepts of making sense and novelty are two features that warrant further illustration. Think for a moment of what could be considered a classic

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## Results and Discussion

The formative evaluation process was particularly helpful in shaping the conceptual layers of the game and the actual physical layout of the stepping stones. Results of the post-experience survey provided insight into whether visitors gained new information or were considering modifying their behavior as a result of playing the Bog of Habits.

### Conceptual Layers

When designing the game, an obvious first question was what conservation behaviors to include in the game. Observation of participants while they played the game as well as post-experience interviews with participants revealed a clear need for a mix of familiar as well as unfamiliar choices.

Familiar choices, such as recycling, driving cars, using juice boxes and using plastic bags for groceries, contributed to an environment that can be made sense of. These were behaviors that visitors already considered in terms of the impact they have on the environment. They were also behaviors the visitors might already be doing. These choices, in other words, drew upon existing knowledge and previous experience of the visitor. Thus, a feeling of competence emerges through providing opportunities for visitors to understand the purpose and focus of the game based on what they already know.

Novelty was added through the use of unfamiliar choices. These included, for example, giving gifts, buying tropical fish for pets, taking vacations, and wearing clothes. Visitors were able to further their knowledge about behaviors that impact the environment through exploring the impact of these unfamiliar choices.

The next conceptual issue was how to present information about the impact that choices have on the environment. In communicating about the effect of different choices it was important to go beyond telling visitors what choices were wrong or right and encourage exploration of various behaviors and their impact. We also wanted to avoid making visitors feel bad about choices they were or were not making.

*Uncertainty*. Formative evaluation indicated that an element of chance and uncertainty helped encourage exploration of choices. Using a spinner to determine the impact a behavior has on the environment added this element of randomness. Each time a visitor selected a conservation behavior, the guide would spin the spinner. Each number on the spinner (e.g., 1, 2, or 3) represented

interaction between a teenager and a parent. One might hear the teenager exclaim "But it's so boring here!" while the parent cries "But it's so dangerous out there!" The teenager is demonstrating a desire for new and different things, for exploration of the unknown. The parent is revealing a need for safety, a fear of the unknown (Ivancich and Kaplan, 1995).

It is likely that boredom with the known and fear of the unknown are two ends of a spectrum found in each one of us, regardless of age. Thus, in terms of exhibit design, a learning environment that "makes sense," addresses our fear of the unknown by presenting opportunities to use information we already have. New information, opportunities that challenge our abilities, and the presence of uncertainty address our need to explore and move beyond that which is known. When designing a competence-producing environment, one of the challenges presented is that of striking a balance between these two forces.

## Methods

Formative evaluation was essential for refining how to create a preferred environment. Participants for the formative evaluation process were visitor groups, defined as two or more persons where one was not in a stroller. Every third visitor group crossing a designated, imaginary line was asked whether they would be willing to play a game and answer a few questions following completion. Interviewers were present while visitors played the activity. However, they did not interact with them until the visitors had completed the game. Selected conservation behaviors were tracked on a diagram of the layout of the stepping stones. Observations of visitor interaction with the game, as well as with one another, were also recorded. After completing the game, visitors participated in a post-experience interview.

The post-experience survey was designed to gain information from visitors on the game itself, both physical and conceptual aspects, and to learn the effect of the game centered on the visitor's familiarity with the choices included in the game and their reaction to how information about the impact of those choices on the environment was presented. Visitors provided information about the physical layout of the game through questions focused on the role of the guide, whether the activity felt game-like and fun, and the layout of the stones in the Bog. Visitors were also asked whether they learned anything new while playing the game and whether they were willing to modify their behavior as a result of playing the game. They were asked to provide examples in both cases.

a different level of impact that a particular choice could have on the environment. For example, for the behavior "drive a car," spinning a 1 resulted in a high impact on the environment. The high impact was represented by a scenario in which an individual did not keep their car tuned and was, consequently, polluting the air. A low impact on the environment, resulting from a spin of a 3, was depicted by the situation in which the owner kept their car tuned, carpooled, combined trips, and used their car less often. Spinning a 2 on the spinner exemplifies a "middle of the road" impact on the environment, one in which the individual owned an efficient, well tuned car but was not carpooling as much as one could. For each of these choices the person traveling across the Bog was instructed to take a step in a different direction (e.g., forward, backwards, or sideways). The direction of the step represented the type of impact the choice had on the Earth. The uncertainty added by the spinner helped depersonalize the game by taking the spotlight off the visitor's individual behavior, allowing them to focus on the behavior in a generic sense.

*Multiple Levels.* The use of the spinner also meant we could present the impacts of choices in multi-layered rather than one-dimensional ways. Without the spinner, each of the above impacts (e.g., high, low, or middle of the road) would have been an individual choice. For example, one stone would have read "drive a car," a second would have read "carpool," and a third might have read "walk or bike." The one-dimensional statement for these choices would have told the visitor only whether the choice was good or bad, something we wanted to avoid.

*Permitting of Choice.* Getting away from dictating "right" and "wrong" behaviors meant the activity continued to encourage individual choice. When the impact was one dimensional, evaluation identified a predominant feeling among visitors, that of "I know, I should be doing this." The multi-layered approach alleviated much of this because visitors could learn about ways to lessen the impact of their present behavior without having to stop doing it all together.

*Making Sense and Novelty.* Adding the multi-layered dimension of the impact of choices contributed greatly to the novel quality of the game as well. It allowed visitors to deepen their knowledge about familiar choices and expand their knowledge about conservation behaviors in general.

*A Humorous Touch.* We also worked on adding humor to the game by making the language in the Stepping Stone Book fun. This was done through the

use of whimsical scenarios (e.g., “you left the sprinkler on and your plants drowned”) and pantomime (e.g., “wipe off your face,” “shake the water off your feet”). Humor added levity to the game and visitors appeared to have fun acting out the actions.

### **Physical Layout**

Recall that a preferred environment is one permitting of choice. A key aspect of the game that promoted choice was the physical layout of the stepping stones. An initial layout consisted of a straight line of pairs of dichotomous choices, such as “recycle” versus “throw it away.” Evaluation revealed that this approach was boring and presented a clear right or wrong choice. We then clustered the behaviors around a particular question and topic area, for example, “How will you get to the store” which focuses the visitor on the issue of transportation (see figure 1.3). Evaluation indicated that visitors tended to select only one or two paths across the Bog of Habits. They were essentially picking the behaviors they felt were “good” for the environment rather than exploring a variety of choices.

When we switched to using multi-layered impacts, we were able to get away from the “good” or “bad” choice problem. The final layout of the stepping stones mixed the conservation behaviors in such a way that there was no clear path to get across. It was important, however, to work out the relationship between the different stones in order to move visitors across the Bog quickly.

We started with choices that visitors already linked to conservation and were likely to be doing already. These included turning off lights, taking bags to the store and using napkins. These were drawn from the familiar choices discussed earlier. We then interspersed unfamiliar choices (e.g., “take a vacation,” “buy carpet,” “use a garbage disposal”) in amongst these familiar ones. A benefit of starting with familiar choices was it enabled visitors to make immediate sense of the activity. If unfamiliar choices were placed at the beginning, there was greater frustration and a tendency for the activity to take longer. The final layout of the stones in the Bog of Habit consisted of 28 different every day choices, each with its own multi-layered levels of impact on the environment.

### Visitor Responses

Table 1 indicates results from a survey administered towards the end of the formative evaluation process (see Table 1.1). Preliminary results indicate that after playing the game, 60% of visitors said they both learned something new and were likely to try a new behavior. An additional 9% said they would probably change their behavior even though they were familiar with all the choices.

The Bog is only one part of a larger visitor experience. To address behavior change outcomes more fully, research suggests that other pieces, such as more concrete action steps (De Young, 1988-89) and success stories (Bardwell, 1991; Monroe and Kaplan, 1988), are necessary. Evaluation is presently underway to test some of these components during summer of 1995.

Behavior change is not a clear-cut entity to study because there are so many different factors that affect whether someone will actually do a behavior or not. However, given principles about human nature and the powerful, participatory tool of formative evaluation, we feel it is possible to develop exhibits that are both responsive to visitor needs and proactive for conservation.

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### References

- Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin*, 84 (5), 888-918.
- Bardwell, L. (1991). Success stories: Imagery by example. *Journal of Environmental Education*, 23 (1), 5-10.

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- De Young, R. (1988-89). Exploring the difference between recyclers and non-recyclers: The role of information, *Journal of Environmental Systems*, 18, 341-351.
- Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1986-87). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *Journal of Environmental Education*, 18 (2), 1-8.
- Ivancich, J. E., & Kaplan, S. (1995). The exploration of clarity and the clarity of exploration. *Unpublished manuscript*.
- Kaplan, R., & Kaplan, S. (1982). *Cognition and environment: Functioning in an uncertain world*. New York: Praeger Publishers.
- Kaplan, S. (1973). Cognitive Maps, Human Needs and the Designed Environment. In W. F. E. Preiser, (Ed.), *Environmental Design Research*. Stroudsburg, PA: Dowden, Hutchinson & Ross.
- Monroe, M. C., & Kaplan, S. (1988). When words speak louder than actions: Environmental problem solving in the classroom. *Journal of Environmental Education*, 19(3), 38-41.
- Rabb, G.B. (1994). The changing role of zoological parks in conserving biological diversity. *American Zoologist*, 34, 159-164.
- Ramsey, C., & Rickson, R. (1977). Environmental knowledge and attitudes. *Journal of Environmental Education*, 13(1), 24-29.



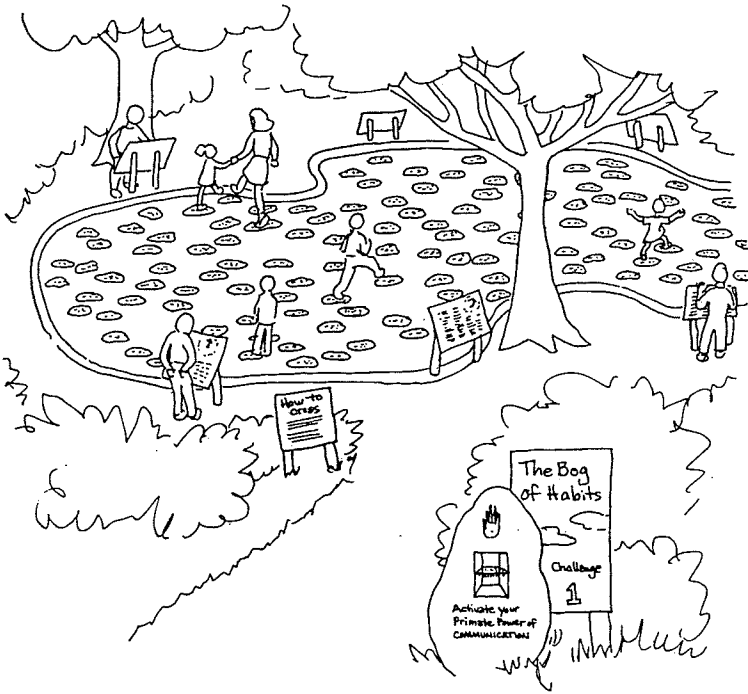
**Table 1.1: Summary of Survey Regarding Knowledge Gained and Willingness to Change Behavior (August 1994). N=90**

	Learned something	Did not learn something
Will do something	54 (60%)	8 (9%)
Will not do something	9 (10%)	19 (21%)

**Figure 1.1: Traditional model of behavior change.**



**Figure 1.2: Bog of Habits (artist's rendition).**



**Figure 1.3: Clustering conservation behaviors around a central issue.**

