Extension Education Methods

Pretesting Public Garden Exhibits Enhances Their Educational Value for People with Diverse Abilities

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ADDITIONAL INDEX WORDS. formative evaluation, interpretive exhibit, sensory garden, accessibility, disabilities

SUMMARY. Formative evaluation (pretesting) can lead to better working exhibits in public gardens. While many botanical gardens and arboreta will attest to the importance of using formative evaluation, it has not been used to develop exhibits for consumers with diverse disabilities. At the Clotilde Irvine Sensory Garden of the University of Minnesota Landscape Arboretum (Chanhassen, Minn.) we are interested in developing exhibits that meet the needs of audiences with disabilities. To that end in 2000, four comprehensive interpretive exhibits were pretested before the final exhibits were installed within the Clotilde Irvine Sensory Garden to determine the exhibits ability to teach concepts to all regardless of disability. The evaluation indicated these exhibits were physically accessible, but needed attention in specific areas to enhance their inclusiveness.

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Informal learning within public gardens and arboreta is different than learning in schools or other formal settings (Screven, 1988). Planning for informal learning through an interpretive exhibit at a public garden requires more than simply focusing on the accuracy and biological relevance of the content. Instead, exhibits must have a clear purpose and the methods for delivering this information to the prospective audience (Philadelphia-Camden Informal Science Education Consortium, 1998). Pretesting (also called formative evaluation) simple prototypes of exhibit strategies and concepts with a small sample of the target audience is essential for effective exhibit outcomes (Bitgood, 1991; Screven, 1988).

Formative evaluation involves pretesting concepts, texts, and/or graphics during the exhibit development phase (Screven, 1991; Shettell and Bitgood, 1993). Developers use low cost, quickly made versions of the most important labels, graphics, objects, layouts, and instruction panels with small-scale samples for the target audiences to evaluate. Results of formative evaluation provide information on items such as how much time visitors will spend at the exhibit, how likely they are to use the interactive devices, how often questions arise about the topic, what misconceptions about the topic come up, what layouts are effective or ineffective for attracting or distracting attention or communication, how effective are display headings, and whether the location of the exhibit is convenient (Screven, 1992). Formative evaluation is useful because it replaces time formerly spent on guesswork, with time spent obtaining concrete information pertinent to planning and, ultimately, to a successful exhibit. Therefore, formative evaluation is essential to shape the final product (Serrell, 1996). The result from the formative feedback leads to an essential cost-effective evaluation procedure built-into the planning and design process of exhibits (Screven, 1988). From formative evaluation one can make appropriate decisions about changes for the permanent exhibit.

To complete the formative evaluation process, Screven (1990) outlined six steps for evaluators to follow. First, develop goals and objectives of the exhibit. Second, define the target audience. Third, determine the reader-level of the exhibit. Fourth, create a comprehensive content outline for the exhibit. Fifth, select an appropriate data collection strategy. Finally, conduct the formative evaluation process, including tabulating and analyzing the data. Upon completion, revise goals and the content outline according to information gathered from evaluation to meet the needs of the audience.

When the formative evaluation process is completed, developers should be able to answer the following questions: Does it get people to stop? Does it keep people at the exhibit? Does it teach something new? Does it motivate people to find out more information? Is the content clear and accurate? Is the content written correctly? (Bitgood, 1992)

The goal of formative evaluation is to guarantee the visitor experience fulfills the purpose of the exhibit through an informal learning environment (Bitgood, 1988). At the Clotilde Irvine Sensory Garden we are interested in developing all-inclusive exhibits that meet the needs of audiences with disabilities. To that end, four interpretive exhibits were pretested before the final exhibits were installed within the Clotilde Irvine Sensory Garden to determine the exhibits strengths and weaknesses.

Methods

This study was conducted in the Clotilde Irvine Sensory Garden at the Minnesota Landscape Arboretum. The Garden focuses on gardening for people of all abilities and includes a sensory walkway, an art garden, gardens for butterflies and birds, rock gardens, and an alle. The Therapeutic Horticulture program centers its activities within the Garden.

In Summer 2000, 91 participants from seven agencies agreed to partici-

pate in this evaluation study. These agencies were Vision Loss Resource Center (Minneapolis, Minn.), a drop in center for people with vision loss and blindness; West Hennepin Community Center (Bloomington, Minn.), an integrated recreation program for young adults; Sojourn Adult Day Care (Spring Lake Park, Minn.), a day care service for frail elders; Choice, Inc. (Excelsior, Minn.), a vocational rehabilitation program for adults with developmental disabilities; Dakota Communities, Inc. (Eagan, Minn.), a variety of group homes serving people with developmental disabilities; Courage Center (Golden Valley, Minn.), a residential service for people with traumatic brain injury; and Chaska (St. Louis Park, Minn.), a drop-in center for adults with mental illness.

Members were asked to voluntarily be interviewed and respond to a series of questions during their experience at the interpretive exhibits. The questionnaire was based on surveys and questionnaires developed and conducted at the Dessert Botanic Garden (Phoenix, Ariz.), the Chelsea Physic Garden (London), and the Sensory Trust (Bath, England). We were interested in gaining an understanding of accessibility at the exhibits and how the participants perceived them. The questionnaire contained eight close-ended and four open-ended questions (Table 1). Question 4 pertained to the accuracy of the braille and was only asked of participants with limited sight (N = 30). Participants were orally interviewed and the interviewer wrote down responses. Questions were asked in the order in Table 1, with exhibits evaluated in order.

Each exhibit was a podium style audio tour system called Stop and Listen: Compact DMR–152.4 cm (60 inches), produced in Canada (Fig. 1). The system is digitally designed to record, store, and play back 60 s of audio information in this case information about plants and the garden. The exhibits are housed in a podium containing a 12.7 cm (5 inches) all-weather speaker system, two arcade-style actuator buttons, an area for standard graphics and overlay panel, universal mounting base, carbon steel construction, and full seam welds. The podiums met all the physical standards mandated for accessibility.

We followed the standards for label accessibility (American Association of Museums/Metropolitan Museum of Art, 1995), which included a minimum 2.5-cm (1-inch) character height, Times Roman typeface, contrast black on white, text panels 121.9 to 167.6 cm (48 to 66 inches) from floor, recessed letters, and, for wheelchair users, height of exhibits no greater than 121.9 to 152.5 cm (48 to 61 inches). In addition, we chose an audio format because visitors without sight would have the opportunity to hear the exhibit independent of the written or graphic information. This also allows visitors with sight to keep their attention on the exhibit and the garden while listening. The disadvantage of this format is the exhibit becomes an isolated experience (due to limitations of space), and there is a greater likelihood of equipment malfunction (Serrel, 1996).

The four exhibits emphasized different aspects of the garden. The purpose of the first exhibit was to provide orientation through the sensory garden via a raised tactile map and audio introduction. The second exhibit described how the brain processes sensory information through touch, taste, sight, sounds and smells. The third exhibit introduced the concept of therapeutic horticulture and the benefits of plants regarding people. The fourth exhibit introduced the concept of pollination and how interdependent plants and insects are upon one another for their survival.

The data collected from the questionnaire was analyzed using descriptive statistics to determine data trends and results.

Results and discussion

Ninety-one participants with varying abilities completed the formative evaluation questionnaire. Participants were 13% male, and 86% female. The age range included 27% of participants were 21 to 40 years; 53% were 41 to 60 years; and 20% were 61 to 80 years.

Of the four exhibits, the least inclusive was Exhibit 1, with 65% indicating the size of writing was too small, 70% indicating the braille was inaccurate, and 76% indicating the graphic was poor (Table 1).

The focal point of exhibit one was a map. Probing of the participants further revealed that exhibit one was at best, unclear; and at worst, incomprehensible. The formative evaluation with participants demonstrated the map was not correctly oriented, nor did it provide any pertinent information for the user. Many participants suggested to omit the map altogether. Participants with sight said they would prefer a map printed on a handout or brochure. Participants without sight indicated the raised tactile map was of no help if one did not have any prior orientation to the area.

The additional three exhibits (Table 1) were physically accessible though lacked inclusiveness. That is, the stations were available to the participants in all manner of physical approach, but all-inclusive access was lacking. For example, at Exhibit 2, evaluators felt it was situated within an accessible distance and height, the labels were accurate and legible, the audio was comprehensive, and graphic logical. Upon the last question (Is there anything else that you would like to add regarding the station?), the participants revealed the station lacked attention to specific areas of detail such as separating the braille from the labels.

The graphic in Exhibit 2 consisted of a crosscut diagram of a brain. Within this diagram of the brain, the locations of sensory receptors were identified. For people without sight, the graphic
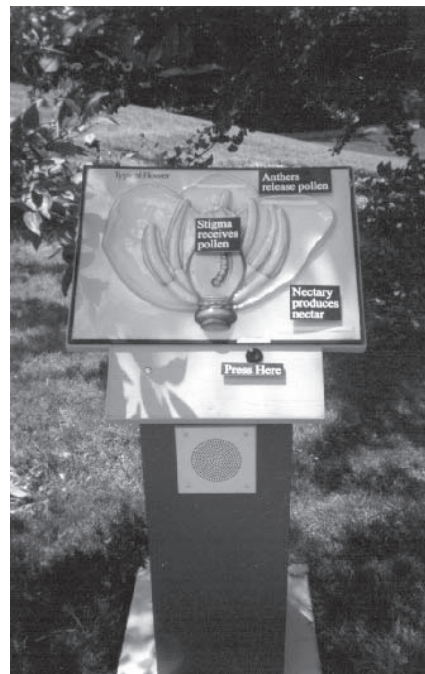

Fig. 1. Exhibit 4. The exhibit explains pollination and the interdependence of plants and animals located within the Clotilde Irvine Sensory Garden in the Minnesota Landscape Arboretum, Chanhassen, Minn. Notice the raised picture and size of text in relation to the entire exhibit.

Table 1. The results of the formative evaluation survey questionnaire which asked participants in this study of their impressions of the exhibits at the Clotilde Irvine Sensory Garden (Minnesota Landscape Arboretum, Chanhassen, Minn.) as they were being developed. The questions were asked in the order listed for Exhibits 1 through 4. The percentage of participants answering the question in each way is listed for each exhibit in the table. N = 91 for all questions, except for question 4 where N = 30 (the number of participants with limited vision). Comments listed for questions 9 to 12 are our summary of comments made by participants about each exhibit.

Question	Proportion of participants answering the question for each exhibit (%)			
	Exhibit 1	Exhibit 2	Exhibit 3	Exhibit 4
1. Would you say the location of the exhibit in relation to the rest of the sensory garden is				
Too far away	7	0	0	33
About right	93	100	100	67
Too closse	0	0	0	0
2. Would you say the height of the station is				
Too high	3	4	0	0
About right	91	86	98	100
Too low	6	10	2	0
3. Would you say the size of the writing at the station is				
Too big	0	0	0	0
About right	35	95	98	100
Too small	65	5	2	0
4. Would you say the Braille at the station is (N = 30)				
Inaccurate	70	37	40	12
Accurate	30	63	60	88
5. Would you say the amount of the information at the station is				
Too much	3.5	30	7	3
About right	78.5	35	90	81
Not nearly enough	18	35	3	16
6. Would you say the style of information on the audio was				
Lighthearted	0	0	0	0
Educational	9	25	35	24
Highbrow	0	2	6	0
Informative	45	27	29	24
Patronizing	0	2	0	0
Interesting	27	19	19	24
Too technical	0	9	0	4
Fun	19	14	11	25
Boring	0	2	0	0
7. Would you rate the graphics at this station as				
Excellent	0	29	8	50
Good	24	60	48	48
Poor	76	11	44	12
8. Would you agree with the following statements about this station				
It taught me something new	25	23	16	25
It encouraged me to look out and study the plants in a different way	21	17	24	21
It obviously was linking plants to their effect on people	11	20	25	9
It was meant for a child	0	4	0	3
I felt more interested in the garden as a result of the station	21	12	24	17
The graphics and audio were essential together	22	24	11	25

	Exhibit 1	Exhibit 2	Exhibit 3	Exhibit 4
9. What do you think other people will enjoy most at this station?				
	Subject of exhibit and audio	Flowers around the station	Seeing people in the mirror amongst the plants	Proximity to the gingko tree
10. What part(s) of this station would be confusing to other people?				
	They won't know where to go from this map	Not enough subject matter with the graphics	Tactile aspect is not helpful to someone with low vision	Needs arrows to parts of plant
11. Explain in your own words what you think this station is about				
	Tells me where I am	How the senses process material	How we relate and benefit from plants	Flower reproduction
12. Is there anything else that you would like to add regarding this station?				
	Use raised letters not recessed	Separate braille from labels	Increase volume at station	Use braille on flat surfaces not bumpy

and audio must be able to stand alone to be comprehensive. But Exhibit 2 lacked the contextual information for those without sight, so the graphic and the audio were necessary, together, in order to make the whole exhibit comprehensive.

Participants stated for Exhibit 3 the height and distance of the exhibit were was accessible, the labels were accurate and legible, the audio was comprehensive, and the graphic logical (Table 1). The graphic at this exhibit included mirrored tiles with a caricature of a Green Man, painted green on the tiles. People with sight were confused by the graphic. It caused cognitive dissonance, thus confounding their overall comprehension of the exhibit's purpose. Once explained verbally, the exhibit made sense to the participants. But without explanation the participant could not appreciate the what the goal of the exhibit was—how people benefit from plants.

As with Exhibit 3, Exhibit 4 also was rated by the participants as accessible. The distance and height were accessible, the labels were accurate and legible, the audio was comprehensive, and the graphic logical (Table 1). Upon the last question (Is there anything else that you would like to add regarding the station?), the participants revealed the exhibit lacked attention to specific areas of detail (i.e., the exhibit was ambiguous next to the surrounding landscape). The exhibit met its goal of teaching information about pollination but did not provide close enough proximity to pollinating insects and flowers.

Although the American Association of Museum's guidelines (American Association of Museums/Metropolitan Museum of Art, 1995) were followed, they were not satisfactory for all participants. People with low vision, or who were without sight, indicated the need for raised letters instead of recessed. Participants reported that it would be easier to feel the texture of the letters making up words if a raised format was used. The contrast of black on white was also difficult for someone with low vision. They indicated preference for the white on black contrast as it would be better in direct sunlight.

Even though there were difficulties and suggestions at each exhibit, the exhibits conveyed their purpose through the combination of graphics and audio (examples of responses shown in Table 1). The responses to question eight indicated the participants were able to fulfill the suggested inquiry set forth by Bitgood (1992). The exhibits encouraged them to stop and think about the topic.

Results from the formative evaluation questionnaire, completed by diverse groups of people with varying physical and cognitive abilities, indicated the exhibits within the Clotilde Irvine Sensory Garden were physically accessible, but certain areas needed to be changed to enhance inclusiveness. Findings revealed that Exhibit 1 should be replaced with another concept design. However, the other exhibits only needed minor refinements in areas such as including the contextual information of graphics, recessing letters on labels, and including the surrounding landscape as part of the whole exhibit experience. Regardless of difficulties with some of the exhibits, participants were able to understand their underlying purpose. The exhibits benefited from the formative evaluation process and were modified to make a more successful experience for future visitors to the garden.

The formative evaluation process benefited these exhibits. The outcomes from this study also helped to incorporate the needs of people with disabilities into the formative evaluation process.

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