

# Universal Design in North American Museums with Hands-on Science Exhibits:

## A Survey

Steve Tokar

*Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.*

Center for Universal Design, 2002

### INTRODUCTION

In the museum world, what do we mean by “universal design”? How widely is it practiced? What do practitioners see as its advantages and disadvantages? In 2002 I conducted the first and, as far as I have been able to determine, only survey of universal design (UD) practice among North American museums with hands-on science exhibits. My focus was on museum practitioners: For which audiences do museum exhibit professionals think their exhibitions are accessible? What is the current level of institutional commitment to creating exhibits that are universally designed and accessible for visitors with disabilities? Which areas need improvement? Where have we succeeded?

### METHOD AND RESPONDENTS

In July 2002, as part of a larger research project, I mailed a two-page “Universal Design/Access Survey” to 405 American and Canadian institutions with hands-on science exhibits. Recipient names were taken from the member list of the Association of Science-Technology Centers (ASTC) and from the mailing list of the National Association for Museum Exhibition (NAME). Where no name was available, the survey was addressed to “Exhibit Director.”

I received 158 responses—a return rate of 39 percent. Five of those respondents did not or could not answer the survey. Of the remaining 153 institutions, 78 reported 100,000 or fewer visitors per year; 56 had between 100,001 and 999,999 visitors per year; 15 reported one million or more visitors per year. Four did not state visitorship (all visitor totals were self-reported).

Responding institutions were located in virtually every region of North America—cities, suburbs, small towns and isolated rural areas. Their numbers included hands-on science centers, natural history museums, children’s museums, aquaria and botanical gardens—a cross-section of North American museums with hands-on science exhibits. While a diverse range

of institutions responded to the survey, it is important to note that due to self-selection, the results may not accurately reflect the views of all institutions with hands-on science exhibits. Institutions with interest and experience in the areas of universal design and accessibility may represent a disproportionate number of responses.

### SURVEY RESULTS

The first three questions asked about basic exhibit accessibility for blind and low-vision visitors, deaf or hearing-impaired visitors and visitors in wheelchairs. These responses provide an indication of the types of audiences that museums feel they are reaching through their exhibitions, and do not reflect the actual accessibility of those exhibitions. Results are summarized in Table 1.

**Table 1.** Institutions reporting levels of accessibility for visitors with different disabilities

% OF EXHIBITS ACCESSIBLE TO:	BLIND/LOW VISION	DEAF/HEARING IMPAIRED	MOBILITY IMPAIRED
0-25%	51% (78)	16% (25)	4% (6)
25-50%	22% (33)	12% (18)	2% (3)
50%	7% (11)	4% (6)	10% (15)
50-75%	11% (17)	25% (38)	26% (40)
75-100%	9% (13)	43% (65)	58% (89)
TOTAL	100% (152)	100% (152)	100% (153)

Overall, blind and low-vision visitors can expect the lowest level of exhibit accessibility; wheelchair users, the highest. Almost three quarters of all institutions reported that half or fewer of their exhibits were blind/low-vision accessible, while 84 percent of all institutions reported that half or better of their exhibits were wheelchair accessible. Access for deaf and hearing-impaired visitors fell between the two, but was much closer to the levels for wheelchair accessibility.

Question 4 asked if advisors with disabilities were consulted during the exhibit development process. This is critical as the involvement of advisors with disabilities is a necessary step in creating accessible exhibitions (Association of Science-Technology Centers, 2000). As shown in Table 2, consultation with advisors with disabilities correlated with institutions' annual visitation.

**Table 2.** Institutions that consult with advisors with disabilities during exhibit development

VISITORS/YEAR	YES	NO
100,000 or less	29% (23)	71% (55)
100,001-999,999	61% (34)	39% (22)
1,000,000+	60% (9)	40% (6)

Smaller museums were far less likely to consult advisors with disabilities. One reason might be that these museums, with smaller staffs and budgets, are less likely to have the time and resources necessary for cultivating relationships with disabled advisors. Questions 5 and 6 asked about accessibility coordinators: Is there one on staff? If so, is he or she consulted during exhibit development? This question is an indicator of the

**Table 3.** Institutions with an accessibility coordinator as a staff member

5. Accessibility Coordinator on staff			6. Accessibility Coordinator consulted on exhibit development		
VISITORS/YEAR	YES	NO	VISITORS/YEAR	YES	NO
100,000 or less	5% (4)	95% (73)	100,000 or less	100% (4)	0
100,001-999,999	25% (14)	75% (42)	100,001-999,999	86% (12)	14% (2)
1,000,000+	50% (7)	50% (7)	1,000,000+	71% (5)	29% (2)
All museums (inc. those that did not report visitorship)	17% (26)	83% (125)	All museums (inc. those that did not report visitorship)	85% (22)	15% (4)

level of institutional commitment to serving visitors with disabilities.

Overall, the larger the institution the greater the likelihood that it had an accessibility coordinator on staff. For institutions with coordinators, it was very likely that the staff accessibility coordinator was consulted during exhibit development.

The next question concerned exhibit development consultants: Are they required to make exhibits accessible? Are they required to include consultants with disabilities in the exhibit development process? Visitorship made no significant difference in responses. Table 4 summarizes the responses regarding exhibit development consultants.

For question 7a, I did not specify what I meant by "accessible," so I do not know how responders interpreted the question. To explain the very high number of "yes" responses, my guess is that the question was interpreted to mean, "Are consultants required to conform with ADA guidelines when designing exhibits?" In response to 7b, the majority of institutions do not require consultants to consult advisors with disabilities.

**Table 4.** Institutions that require exhibit development consultants to create accessible exhibitions

7a. Consultants must make exhibits accessible		7b. Consultants must consult advisors with disabilities	
YES	NO	YES	NO
89% (118)	11% (14)	17% (20)	83% (100)

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Question 8 asked if formative evaluation is a regular part of the exhibit development process. As shown in Table 5, the larger the museum visitorship, the more likely an institution is to use formative evaluation in exhibit development.

**Table 5.** Institutions conducting formative evaluation as a regular part of exhibit development

VISITORS/YEAR	YES	NO
100,000 or less	57% (44)	43% (33)
100,001-999,999	76% (41)	24% (13)
1,000,000+	93% (13)	7% (1)

Question 9 asked whether exhibits are formatively evaluated for accessibility.

**Table 6.** Institutions that include access as part of formative evaluation

VISITORS/YEAR	YES	NO
100,000 or less	68% (30)	32% (14)
100,001-999,999	76% (31)	24% (10)
1,000,000+	57% (8)	43% (6)

As shown in Table 6, museums with smaller visitorship were more likely to report including access as part of formative evaluation as compared to the other museums. Again, the word “access” was not defined, making it difficult to speculate on why small to medium-size institutions formatively evaluate exhibits for access at a higher rate than museums with a million-plus visitors per year.

Question 10 asked whether respondents were familiar with the term “universal design” before they received the survey. Question 11 asked if exhibits were developed according to universal design guidelines.

**Table 7.** Institutions familiar with “universal design”

10. Familiar with the term “universal design”			11. Exhibits developed according to UD design guidelines		
VISITORS/YEAR	YES	NO	VISITORS/YEAR	YES	NO
100,000 or less	47% (37)	53% (41)	100,000 or less	67% (52)	33% (26)
100,001-999,999	79% (44)	21% (12)	100,001-999,999	84% (47)	16% (9)
1,000,000+	73% (11)	27% (4)	1,000,000+	67% (10)	33% (5)

As shown in Table 7, museums with the smallest visitorship contain the greatest proportion—over half the group—of respondents who were previously unfamiliar with the term “universal design.” This may be because employees of smaller museums have fewer opportunities to attend conferences and workshops where they might be introduced to new terminology. Due in part to the efforts of the Association of Science-Technology Centers *Accessible Best Practices* program, the number of conference presentations related to accessibility and universal design at the ASTC annual conference has risen in recent years.

Question 11 presented a puzzle. The answers would seem to indicate that a number of small to medium-size institutions have been developing exhibits according to guidelines of which they are unaware. There are two possible explanations. One is that respondents interpreted “universal design guidelines” in this question to mean “ADA accessibility standards.” The other is that once they read the definition of “universal design” in the questionnaire, a number of respondents realized that their institutions’ exhibit development guidelines were universal in nature, if not in name.

Question 12 asked if the accessible features of each exhibit were included

in the basic design or added on afterward. There was virtually universal agreement on designing in accessible exhibit features from the start. Ninety-six percent of the respondents stated that accessible features were included in the basic design, as compared to 4% who stated that they were added on.

Questions 13 through 15 asked respondents for their views of benefits, challenges and best examples of universal design. To these qualitative questions some respondents gave multi-part answers that fit into more than one category. Thus, for each of the three, the number of responses is greater than the number of respondents.

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**Table 8.** “In my opinion, the benefits of applying universal design to exhibit development are...”

RANK	RESPONSE CATEGORY	REPOSSES % (#)
1	Access for all/ greater general use	69% (95)
2	Improved exhibitry/ saves money	16% (22)
3	Increased attendance/better customer service	12% (17)
4	Common sense/ right thing to do	4% (6)

Regarding the benefits of universal design, the largest answer category by far—69 percent—might be summarized as “access for all” or “of value to every visitor,” implying that these respondents viewed universal design as something more all-encompassing than design that accommodates specific disabilities.

The second largest category, “improved exhibitry” (16 percent), covers a broad range of answers from “cuts down on redesign” to “addresses different learning modalities”—the general idea being that a universal approach results in better exhibits and/or a more efficient exhibit development process.

Respondents in the third category (12 percent) saw UD working to the direct advantage of visitors, resulting in happier visitors in greater numbers. A fourth very small group expressed a view of universal design as simply the correct thing to do.

**Table 9.** “The challenges of applying universal design to exhibit development are...”

RANK	RESPONSE CATEGORY	REPOSSES % (#)
1	Cost	43% (59)
2	Can’t be all things to all people	30% (41)
3 (tie)	Space	19% (26)
3 (tie)	Accommodating a specific disability	19% (26)
4	Administrative/ designer resistance	8% (11)
5	Requires creativity	6% (8)
6	Disabled visitors, a minority requiring special accommodation	4% (5)

To the question regarding challenges, the first-ranked response was “cost” (43 percent). The reasoning behind the response was indicated to me during subsequent in-depth interviews with developers and other exhibit team members. In terms of materials, a universally designed exhibit generally does not cost significantly more than a non-universal exhibit. But good universal design takes more thought and often more evaluation, thus more time, and thus greater overhead cost. Also, some specific accommodations, such as video captioning, do cost more money above and beyond the cost of the exhibits themselves.

The response ranking second, at 30 percent, was usually phrased as, “can’t be all things to all people,” or “difficult to make accessible to all.” This set of

answers reflects an acknowledgement of the reality that almost no individual exhibit is truly *universally* accessible. Inevitably, some visitor—one who is blind, or in a wheelchair, or very young—is going to find that some exhibit is not accessible physically, intellectually or otherwise. Universally aware designers and developers anticipate this limitation and deal with it by making sure that *within exhibition or exhibit group*, there will be exhibits accessible to as many kinds and ages of visitors as possible (Museum of Science Boston, 2001).

“Space” and “accommodating a specific disability” were the responses that tied for third, at 19 percent. “Space” usually indicates a straightforward challenge of providing wheelchair access in a cramped exhibit area—a problem shared by some older institutions and those housed in historic structures that cannot be significantly modified. Specific disability issues included, “not all vision exhibits can be made accessible to blind visitors.”

Response category number four, with 8 percent, “administrative/designer resistance,” reflects a feeling that the commitment to creating accessible exhibitions is not the same amongst all staff within an institution.

The fifth in the list of challenges, “requires creativity/flexibility,” interprets universal design as a spur to creative thinking. Finally, the last ranked challenge, with only five respondents, interpreted universal design to mean the accommodation of visitors with disabilities at the expense of all other visitors—for example, “compromised function for all to benefit the few.”

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## Universal Design In North American Museums (continued from page 9)

The last question of the survey, question 15, asked exhibit professionals to share specific examples of universal design in their museums. Table 10 summarizes their responses.

**Table 10.** Example(s) of universal exhibit design in “my” museum

RANK	RESPONSE CATEGORY	REPONSES % (#)
1	Wheelchair access	40% (34)
2	Exhibits/exhibitions by name	36% (30)
3	Hands on/multisensory exhibits	20% (17)
4	Blind/low vision access/Braille signage	17% (14)
5	General accessibility	15% (13)
6	Accommodations for deaf visitors	9% (8)
7	Advisors with disabilities	5% (4)

Respondents chose to interpret this question in several different ways. Some discussed accessibility in terms of accommodation for specific disabilities—mobility, sight or hearing impairment. Some listed specific exhibits or exhibitions in their institutions. Others noted a general policy of accessibility, e.g., “Try to make as accessible as possible for all.” Finally, there were those who talked about more general attributes of universal exhibit development: hands-on or multisensory exhibits, or inclusion of advisors with disabilities in the exhibit development process. The broad range and relatively even distribution of responses indicated an equally broad

range of interpretations of the phrase “universal exhibit design.”

### CONCLUSIONS

Given the shortcomings of the survey noted above, I must stress that the data presented here are simply *suggestive* of trends, attitudes and practices in North American hands-on science museums in 2002. Given that restriction, we can arrive at some general conclusions.

As of summer and early fall 2002, the concept of universal design, in name or in practice, was familiar to and viewed favorably by most exhibit practitioners who responded to the survey. The larger the institution (in terms of visitorship), the more likely that advisors with disabilities were consulted during exhibit development, and the more likely that there was an accessibility advisor on staff who participated in exhibit development. Most institutions are using formative evaluation during the exhibit development process, and most of that group evaluated for access, or at least for ADA compliance.

Most respondents viewed universal design as being of benefit to *all* visitors—a conceptual leap beyond the attitude that design for access excludes visitors who do not self-identify as disabled.

The greatest practical challenges to practicing universal design were cost and space, followed by the ability to provide accommodation for specific disabilities. Philosophically, a sizable number of respondents acknowledged that universal exhibit design was not literally universal, because there will always be some exhibits that are not accessible to some visitors.

The wide range of UD examples given indicates that among museum professionals, universal design does not have a universal definition. For some, it means designing to accommodate disabilities; for others, it means design for all.

Overall, the “Universal Design/Access Survey” indicated that within a broad range of definitions, the concept and (to a lesser extent) practice of universal design are well established among people who design and develop hands-on science exhibits in North American museums. Much remains to be done—but there is a firm basis for future success.

### REFERENCES

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### THE AUTHOR

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Presented by the American Museum of Science and Energy. What: Special exhibit opening: Secret Growth. When: Grand opening March 13 with reception from 6-8pm. The exhibit runs until May 25. Where: American Museum of Science and Energy, 115 Main Street East Oak Ridge, TN 37830. Why: The Manhattan Project was plagued by segregationist practices. See the world through the eyes of a scientist. Oak Ridge National Laboratory's Art of Science contest shares the beauty of scientific discovery and knowledge through visually compelling images. Whether captured with a camera or a microscope, the 2018 winners showcase the research taking place at the nation's largest science and energy lab. Ed Westcott's "Secret City Revealed". Resources for museum professionals on employing a universal design approach for exhibits, programs, and evaluation. Since the late 1980s, the Museum of Science, Boston has employed a universal design approach to museum education. Beginning with the refurbishment of a traditional natural history diorama exhibition, universal design principles have expanded into the development of our exhibits, public programs, and evaluations. The report on this page catalogues the current approach to universal design for museum education utilized at the Museum of Science in its exhibits, programs, and evaluations. We are in the process of expanding this document into a website, so check back here soon. The Museum's Birds Halls portray the wide variety of avian life on the planet, and the Hall of Reptiles and Amphibians reviews the anatomy, behavior, and various adaptations of these vertebrates. The Earth and Planetary Sciences halls showcase remarkable specimens, including meteorites, minerals, and rare gems, that offer clues about the origins of our solar system and the dynamic processes of our planet. Please note: the halls of gems and minerals are closed for a major renovation. One of the premier attractions in New York City is the Museum's series of fossil halls, including its two famed dinosaur halls in the David H. Koch Dinosaur Wing, as well as the Lila Acheson Wallace Wing of Mammals and Their Extinct Relatives.