

COMPLETION OF UNIVERSAL DESIGN PERFORMANCE MEASURES

M.F. Story, MS, IDSA, J.L. Mueller, MA, IDSA, M. Montoya-Weiss, PhD
The Center for Universal Design, School of Design, North Carolina State University, Raleigh NC

ABSTRACT

The authors developed and tested two sets of Universal Design Performance Measures that reflect the Principles of Universal Design. One version is useful for product designers developing new products and the other version for individuals assessing products before purchase. The Measures were tested by a diverse group of 60 consumer households and 18 professional product designers using four common household products.

BACKGROUND

The authors are conducting a three-year field initiated project, funded by the National Institute on Disability and Rehabilitation Research (NIDRR), titled "Promoting the Practice of Universal Design." The purpose of the project is to increase the acceptance and adoption of the universal design approach by mainstream product industries. One project task is to develop a method of evaluating products to determine their universal usability; another task is to develop an evaluation service for industry based on this evaluation method. The project began in June 1998 and is scheduled to run through May 2001.

STATEMENT OF THE PROBLEM

This paper presents the results of the first two and a half years of project work regarding the development of a set of Universal Design Performance Measures that are based on the Principles of Universal Design (1) and are easier to apply. The Performance Measures are intended for use by product designers to guide the development of more universally usable new products and by consumers to assess products, either before purchase or already owned.

DESIGN

The authors originally had hoped to develop a single set of Universal Design Performance Measures that could be used by consumers as well as designers so both groups would be literally working off the same page. This, however, proved to be inappropriate. Consumers are concerned only with issues that relate to their personal needs, while designers should address the needs of the widest diversity of users concurrently. Each of these constituencies requires its own document.

For this reason, two versions of the Universal Design Performance Measures were developed. The consumer and designer versions of the Survey each comprise a set of 29 statements that correspond to the 29 guidelines associated with the Principles of Universal Design.

DEVELOPMENT

The initial phases of the process of developing the Universal Design Performance Measures were described in two earlier papers, published in the proceedings of the RESNA '99 and RESNA '00 conferences (3) (4). Five distinct versions of the Performance Measures were drafted and reviewed by 28 consumers with disabilities, 18 professional product designers, and 12 marketing managers from across the United States. These were distilled into two working versions of the Universal Design Performance Measures, one for consumers and one for designers. The two documents were reviewed by five project advisors and pilot-tested by four colleague advisors who

U.D. PERFORMANCE MEASURES

suggested changes that were incorporated into the documents used in the testing phase. The final versions of the Measures were reviewed by a professional survey designer for clarity of wording.

EVALUATION

Testing of the Universal Design Performance Measures was conducted with consumer households and professional product designers. Test participants were chosen to be as diverse a group as possible in terms of age, abilities, race geographic location, and socioeconomic status. In order to assess the true universal usability of the Performance Measures, the consumer group included 60 households, 36 of which contained at least one member with an identifiable disability and 24 of which contained no one with a disability. The designer group included 18 households, some containing individuals with disabilities, representing a range of experience with and attitudes toward universal design.

Each household was sent four common home products: a cordless handheld vacuum cleaner, and alarm clock, a plastic food storage container, and a set of single-serving cereals. Participants were asked to have everyone in the household use each product, as appropriate, and keep a carefully structured journal documenting everyone's use of and comments about the products. After using the products for few weeks, the test participants were asked to complete four sets of Universal Design Performance Measures, one for each product. (The consumer households received the consumer version of the Measures and the designer households received the designer version.) Each household was asked to provide some basic demographic information, to describe their past experiences using these types of products, and to evaluate the Performance Measures themselves.

The rate of participating households completing the testing was 79% overall: 83% (50 of 60) for consumer households and 67% (12 of 18) for designers. In order to compare the discrete responses on the Measures to the qualitative comments in the journal, both were converted into numerical scores, as follows:

Measures Response	Score	Journal Comments	Score
“Strongly Disagree”	1	Very Negative	1
“Disagree”	2	Negative	2
“Neither Agree nor Disagree”	3	Neutral	3
“Agree”	4	Positive	4
“Strongly Agree”	5	Very Positive	5

In general, the responses on the two documents tracked well. However, as a group, the product designers who took part in the testing were more critical of each product than were the consumers. This may be because the designers knew how the products could be changed to make them easier to use. The designers may be more demanding of design and may have been less likely to blame themselves for any problems experienced.

During the recruiting phase of the project, staff asked the designer applicants about their previous experience with and knowledge of universal design. This enabled a comparison between designers with different levels of knowledge on their ratings of the usability and usefulness of the Universal Design Performance Measures. While the size of the sample was quite small, the trends were clear: the higher the level of knowledge of universal design, the more useful the designer believed the Performance Measures to be. This finding implies that simply providing designers with a paper tool like this one is not enough to support their effective practice of universal design.

U.D. PERFORMANCE MEASURES

The usability and disability issues imbedded in Performance Measures may not be obvious to the novice user. Additional information may be needed to maximize the utility of the Measures.

DISCUSSION

Developing a set of performance measures for assessing universal design was not simple but the authors believe the Universal Design Performance Measures were proven to have value. The Performance Measures are useful for identifying potential areas for improvement for a product; for comparing relative strengths of similar products; and for identifying potential strengths of a product such as for marketing purposes.

The Universal Design Performance Measures are limited, however, in several aspects. First, the wording in the Measures is so generic it is sometimes difficult for respondents to interpret the statements. Second, it is important for the respondents to apply the Measures separately to each phase of use of the product, such as reading and opening the package, reading and understanding the instructions, using the product, maintaining the product, etc. Third, the results of this project suggest that the quality of the results achieved applying the Measures may depend on the knowledge base of the respondent. Finally, the Universal Design Performance Measures for Designers require the assessor to guess how this might be used by diverse groups of people because, for example, closing your eyes is not the same as being blind. One of the most important truths reinforced by this project is that while suggestive, applying a paper tool such as the Performance Measures is no substitute for consumer testing.

The authors believe that the next generation of the Universal Design Performance Measures should be electronic and multi-layered. While this would increase their complexity, it would also increase their usability. An electronic tool would enable users to select the information they need based on the type of product, the aspect of use under consideration, and their level of knowledge of disability and universal design.

REFERENCES

1. Story, MF (1998). Assessing usability: The principles of universal design. Assistive technology, Volume 10.1, pp. 4-12.
2. Story, MF, Mueller, JL, Montoya-Weiss, M, & Ringholz D (1999). The development of universal design performance measures. Spotlight on technology: Proceedings of the RESNA '99 annual conference, pp.100-102.
3. Story, MF, Mueller, JL, Montoya-Weiss, M, & Ringholz D (2000). Progress in the development of universal design performance measures. Technology for the new millennium: Proceedings of the RESNA '00 annual conference, pp. 132-134.

ACKNOWLEDGMENTS

This work was supported by National Institute on Disability and Rehabilitation Research, U.S. Department of Education, under grant #H133G80060. The opinions contained in this manuscript are those of the Dept. of Education.

Molly Follette Story, MS, IDSA, Principal Investigator
The Center for Universal Design, Box 8613, NC State University, Raleigh, NC 27695-8613
16438 East Dorado Avenue, Aurora, CO 80015-4061
Voice/TTY: (303) 699-8133 / Fax: (303) 699-4703 / E-mail: molly_story@ncsu.edu

Copyright © 2001 RESNA

Proceedings of the RESNA 2001 Annual Conference: The AT Odyssey Continues. Arlington: RESNA Press.