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DESIGN RESOURCES

DR-12 The Effectiveness of Universal Design:
Case Study Demonstrations

The Effectiveness of Universal Design: Case Study Demonstrations

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Universal designs are characterized by their ability to provide equitable experiences to all users. Perhaps the most direct measure of universal design is the degree to which a design enables comparable activity performance by everyone. Evaluating the effectiveness of universal designs is traditionally done through case studies conducted in field settings by experts. The following two field case studies investigate claims that universally designed environments are more usable by all consumers than similar non-universally designed environments. Subjective and objective measures were developed to test this claim. These measures evaluate the perceptions and performance of participants with varying degrees of physical and/or sensory impairment. If universally designed environments facilitate equitable use, evidence can be found in participants' perceived and observed behavior.

The first case study examined the extent to which the claimed benefits of universal design are actually realized through an evaluation of the Lighthouse International's Manhattan headquarters. Lighthouse International is an organization primarily serving people with vision impairments. Although the headquarters building predates the formal publication of universal design's seven principles (Connell et al., 1997) it is recognized as one of the first exemplars. This study employed the subjective Environmental Utility Measure (EUM) to rate participants' perceptions and the objective Functional Performance Measure (FPM) to rate participants' observed performance of environment specific activities (Danford & Steinfeld, 1999; Steinfeld & Danford, 2000). The EUM asked participants to rate how difficult and acceptable activities were, while the FPM subsequently rated by investigators looked at participants' actual level of effort and level of assistance required to complete activities.

Four populations were targeted including three groups of people with permanent physical and/or sensory impairments (i.e., mobility, vision and hearing) and one group with no impairment. The case study examined (1) participants' general perceptions of activities in most buildings, (2) their perceptions of activities in the case study building and (3) their observed behavior in the case study building. Researchers hypothesized that activities performed in the Lighthouse International headquarters would be perceived as easier and more acceptable to the user than would the same activities in most other buildings, and at the same time would require low levels of observed effort and assistance. All data collection took place on site at the case study building.

While not all participants with impairments experienced the same levels of usability as participants without impairments, the additional effort expended and assistance received to enable certain participants to complete the activities was remarkably low. The Lighthouse International headquarters was perceived by all four groups of participants to be more usable than most other buildings. Relatively few participants required marginally higher effort and/or assistance to perform any of the activities. Though the case study building may not have achieved the theoretical ideal of absolute equity in use, it did come remarkably close (Danford, 2003).

A second case study was performed to validate these findings. Concerned that the responses to the first case study may have been skewed by the obvious effort to promote inclusion in the Lighthouse International building's design, the second case study focused on participant data from four actual fast food restaurants. All universally designed features in the original buildings were aggregated based on their level of inclusion and used to represent a single composite restaurant. Results were then re-distributed to define three composite fast food restaurants – one a Universally Designed restaurant, the second an ADAAG compliant restaurant and the third an ADAAG non-compliant restaurant. This prevented the biasing of responses suspected in the previous study. In this study the EUM and the FPM were again used to collect information about activities.

Preconceived notions of universal design as synonymous with accessible design were mitigated by targeting somewhat different user populations for this study. The populations tested included adults accompanied by small children in strollers, adults inexperienced with temporary mobility problems (e.g., simulated sports injuries affecting lower body mobility), adults experienced with their permanent mobility impairment (i.e., long-term users of wheelchair or scooters) and adults with no physical or sensory impairments. Of the adults simulating new temporary mobility impairments, half wore a leg brace that partially immobilized one knee while the other half used a manual wheelchair. Including parents with strollers, people simulating lower body injuries, and people with no condition, the case can be made that universal design has benefits extending far beyond those afforded protection by the Americans with Disabilities Act.

Analysis of this study's data continued to support universal design's claimed benefits. The findings confirmed that the composite universally designed building was more usable than the composite ADAAG compliant building, which was more usable than the composite ADAAG non-compliant building. There were also predictable differences in the usability of each composite restaurant by participants in the four sample populations. As expected, participants without impairments experienced virtually no problems using any of the three composite buildings. Participants simulating new temporary mobility impairments predictably had experiences similar but not identical to participants with long-term permanent mobility impairments. Though participants with long-term permanent mobility impairments were clearly more adept at using their wheelchairs in all three composite buildings, the data suggest that they were more intolerant of design attributes that made certain building features more difficult to use. As an approach to designing environments, universal design has proven to be effective in lowering the perceived difficulty of activities while improving their acceptability. The same activities in the presence of universal design have also been noted as requiring less effort and assistance, essentially granting occupants of universally designed environments greater independence.

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