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Universal Design:
Including Everyone in Virtual World Design

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Abstract

Three broad approaches exist to the issue of accessibility design within virtual worlds. Our intent is to stimulate the thinking of content designers within virtual worlds about these approaches, so that they can consider which approach best fits the desired intent and audience of their creation.

Keywords: universal design; accessibility; design; virtual worlds.

Universal Design:
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Real World Disabilities

People with real world disabilities, with impairments that may be permanent, temporary, or related to increasing age, are present in casual online games in higher proportions (~20%) than in the real world (~15%) (Information Solutions Group, 2008). Virtual worlds do not remove all accessibility issues experienced by people with disabilities in the real world, and in fact, exacerbate some existing issues and introduce additional ones. Some disabling real life conditions, e.g., paralysis or loss of legs, do not affect functioning in virtual worlds. Other conditions -print impairment, hearing impairment, and keyboard/mouse use impairment - may be more disabling in a virtual environment than in real life. Therefore, the design of virtual worlds should take into account those disabling conditions that affect a person's functioning in those worlds.

Avatar Identity

In the real world, most people can only change their appearance through modification of hair style and coloring, makeup, and clothing. Virtual worlds allow much more choice in how participants present themselves to other inhabitants. The chosen avatar is an embodiment of selfhood. Some choose avatars that reflect either their idealized vision of themselves or a totally fantastic creation, while others choose avatars that more closely mimic their real life identity. Some choose to be young beautiful and perfect humans, others become dragons, and some choose to have their avatars more reflective of their real-life age, physical characteristics, and disability status.

Accessibility

Accessibility of the virtual world is a function of the design of structures and landscapes inside the world, whether created by the developer (such as in World of Warcraft) or by the citizens of the world (such as Second Life®). Accessibility of the virtual world contrasts with accessibility issues related to access to and within the world. Those issues include signing up and connecting to the user interface. That type of accessibility is covered by existing web accessibility standards[1] related to allowing people who use assistive technology to function similarly to those who don't use it, and is not the focus of this paper.

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1 In the US, standards include Section 508 (www.section508.gov/) and Title II of the ADA (http://www.ada.gov/pcatoolkit/chap5toolkit.htm), and internationally the Web Accessibility Initiative (http://www.w3.org/WAI/)

Universal Design

Universal Design (UD), developed at North Carolina State University, is the construction of environments so that all people may use them without needing specialized designs as adaptations for disabilities. In operation, the principles of UD benefit all users, to the greatest extent possible, not just those with disabilities. For example, curb cuts, which are critical to wheelchair users, are also helpful for people with wheeled luggage, grocery carts, or strollers. Focusing on common needs of all people avoids segregating those who need adaptations, because UD is appropriate for all users.

Three Approaches to Accessibility of Virtual Worlds

The first two approaches described below represent ends of a spectrum of use of real world accessibility standards. The third approach focuses on accessibility issues to virtual worlds, rather than on those of the real world.

Approach One - No Accessibility Standards

For much of the current state of virtual worlds, this is the default approach: minimal consideration has been given during design or construction to accessibility issues.

This may be the approach used when the objective of the designer is historical accuracy or artistic creativity. Structures and landscapes in virtual worlds that are representations of actual historical places generally will not be different in accessibility from what they represent. In the real world, it would be prohibitive and potentially destructive to retro-fit the Parthenon to meet accessibility standards. Similarly, if a design is inherently inaccessible because of certain creative features, real world accessibility standards may not be appropriate.

Approach Two - Emulation of Real Life Standards

Using the second approach, virtual world environments emulate, as far as possible given the design and construction constraints of the particular online world, the features desirable in the physical world. Features required by accessibility standards in the real world are imported into virtual worlds because they are important in the real world.

For instance, ramps allow virtual wheelchair users to move from pathway to building or between building levels. In the emulation approach, these ramps have handrails and access signage as they would in the physical world. Grass, sand, and deep carpet textures for the ground are avoided because they are difficult to move a wheelchair across. Standards for this kind of accessibility exist in the real world[2].

Figure 1. This model accessible home's kitchen shows knee room under counters, adaptive cutting board, and front-mounted controls on the stove.

This approach creates a learning opportunity for non-disabled people to see the elements of real-world accessibility in action. The complete accuracy and familiarity of this approach may be comforting to some people with disabilities who expect virtual worlds to mirror their real world environment.

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[2] In the US, ADA Guidelines for Building and Facilities (http://www.access-board.gov/adaag/html/adaag.htm), the Uniform Federal Accessibility Standards (http://www.access-board.gov/ufas/ufas-html/ufas.htm), and the Fair Housing Act (http://www.fairhousingfirst.org/fairhousing/requirements.html

Approach Three - Universal Design of Virtual Worlds

This virtual world-centric approach involves using the unique features of virtual worlds to provide accessibility appropriate to those worlds, rather than emulating real world accessibility standards. This perspective takes into account the impairments specific to virtual worlds to create accessibility in landscapes, structures, communication, and movement.

In virtual worlds, input is restricted to vision and hearing. Conveying print or visual information using small fonts, minute details, semi-transparent textures, or other difficult-to-see features may make the information inaccessible to some users. To make information accessible to those with vision or reading impairments, designers should examine font size, as well as background and text color for readability; offer the same information in sound files; and create objects with descriptive names. These practices can also benefit people with dyslexia and non-English speakers and will make information more readily available to many, not just to those with vision impairments.

Consideration should be made for people with hearing impairment. When presentations are conducted in voice, they should be simultaneously transcribed into print (voice-to-text or V2T) to avoid excluding those who cannot hear. Sound signals, such as for starting a race, should also be given in a simultaneous visual manner.

Keyboard- or mouse-use impairment can make movement in a virtual world challenging. Many people find spiral staircases difficult to navigate. Climbing one of these generally requires tightly controlled multi-keystroke keyboard input. Straight stairs or ramps that do not require absolutely accurate aim are easier to navigate. People with manual dexterity issues sometimes fall off walkways that are suspended and without borders. Designers can provide guidance using themed railings, landscaping, or invisible barriers to subtly guide people along the path.

In meeting spaces, people in wheelchairs should have a choice to sit in multiple areas of the seating, not all be segregated into a single seating area. Ideally, there are no stairs, only ramps, and every seat has a clear view of the presenter.

Figure 2. This accessible auditorium features wide paths, ramp access, and multiple areas for wheelchair seating, but no accessibility signage nor handrails.

Using this approach, the structures, landscapes, communication, and movement of the virtual world will be accessible to all its inhabitants without designating specific adaptive features for some subset of them. Implementation of Universal Design principles means the virtual world will be more convenient and accessible to everyone. Guidelines and descriptions of best practices for Universal Design of Virtual Worlds are starting to emerge (Zielke, Roome, and Krueger, 2009).

Recommendations

The authors do not claim that any of the three approaches to accessibility of virtual worlds is inherently better than another. The chosen approach must fit the creator's intent and audience. Content creators in virtual worlds should consider these approaches and purposefully select one to follow.

However, we advocate that, in most virtual world situations, designers incorporate accessibility principles that are appropriate and germane for that virtual world, and not be constrained to a literal translation of Real World standards and requirements. We conclude that this is a definition of Universal Design of Virtual Worlds.

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