

# training and advocacy

## UNIVERSAL DESIGN: DESIGNING WITH YOU IN MIND

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Photos courtesy of Cindi and Rochelle

*“ Universal Design (UD) is the design of products and environments to be useable by all people, to the greatest extent possible, without the need for adaptation or specialized design”*

Ron Mace, founder of UD, architect

While an earnest principle for all members of society, no where does this standard ring truer than for those individuals with special needs, or for the families caring for them. Thankfully, Ron Mace's vision of Universal Design continues to march forward with builders and product developers embracing ADA compliance codes. At the same time, the remodeling & housing industry has reached record highs in the past few years. This in turn has opened the door to a plethora of opportunities for families of individuals with special needs. Never before have there been so many choices and options available when creating a living environment for “children” with special needs. According to UD, “children” is a term more aptly related to offspring, as opposed to age. Therefore the principles presented within this article will address the needs of children whether they are 3 or 63!

### BEGIN WITH THE ENTRANCEWAY

Keeping the 7 principles in mind, begin with the entrance to your home. If possible, choose a design with

at least one stepless entrance to minimize the worry about steps or ramps. Transitions should not exceed a “ beveled edge on an exterior door. Take a good look at your main entry door. When addressing the entryway (and hallways), look for doors that are 32-36” wide. These are best for wheelchairs and walkers, providing room for any additional equipment you may need as your child's needs change. How about the door-knob? Make sure your door handles pass the “closed fist” test. Can the door be opened with a closed fist? Lever style handles,<sup>1</sup> mounted 48” high or less, will allow persons with spasticity or arthritis to open the door. Consider getting automatic door openers/closers.<sup>2</sup> These allow for maximum independence and can be installed on most any door. This also eliminates the need to check for force required to open/close a door, since it is one thing to operate the doorknob, but it is another to be able to push it open or to turn around and close it!



## THE 7 BASIC PRINCIPLES OF UNIVERSAL DESIGN\*

### 1. Equitable Use

Could all users use this product in the same way? With safe access?

### 2. Flexibility in Use

Does the product allow for multiple methods of operation? Right vs. left hand, hand vs. foot etc?

### 3. Simple and Intuitive Use

Is the product simple and straightforward? Can you operate it without instructions?

### 4. Perceptible Information

Can this be used by those with sensory impairments (i.e. limitations in vision, hearing, sight?)

### 5. Tolerance for Error

Will the user not be harmed if they make a mistake? Are the features arranged to draw attention to the critical steps?

### 6. Low Physical effort

Can this be used without causing pain? Can someone with limited strength or vitality use this product?

### 7. Size and space

Can you see the product and use the important elements from any position? Seated or standing?

\* As defined by The Center for Universal Design, N.C. State University

## HALLWAYS AND FLOORS

Once in the house, 36" wide hallways allow for ease of maneuverability while also preventing scuffs and holes from accidental bumps. At this point it is imperative to consider flooring. If possible the flooring should be slip-resistant and uniform throughout the home, eliminating the need for thresholds. This allows wheelchairs, canes, or a shuffling gait to safely and easily access all points of the house. Look in the commercial flooring section of major manufacturers for aesthetically pleasing, commercial grade flooring with traction, microbial properties, and high use durability. If using carpet, look for commercial grade, low-pile carpet. The hallway areas generally require more lighting than normal, especially at night. Options include recessed lights placed on a dimmer or motion sensor; or LED lighting that runs the length of the baseboard or behind grab bars or handrails.

## BATHROOMS AND KITCHENS

In bathrooms and kitchens, longevity and livability are two terms that will protect your investment. Be sure to make choices that will withstand the test of time both structurally and functionally. You don't want to have to re-route plumbing years later when a disability changes, replace expensive equipment due to equipment abandonment or reconstruct cabinetry. At the same time, all members of your family should find the products you choose comfortable, functional, and aesthetically pleasing.

Start in the bathroom beginning with the threshold. There should be no threshold or zero transition change between your hall floor and the bathroom entrance. This makes it easy for wheelchair entry and eliminates a tripping hazard for those with a shuffling or poor gait or low/no vision. If you must have an interior transition, aim for one no higher than 1/4". The bathroom doorway should be at least 32" wide- preferably 36", to accommodate a standard size adult wheelchair and hand safety/projection rims, etc. Consider offset door hinges to provide even more room (2 extra inches of clearance). Pocket doors, when possible, eliminate a need for clearance. Again, all doors throughout the house should have lever style handles. (Remember the closed fist test!)<sup>3</sup>

As you walk in, look at the light/fan switch. Considerations include: motion sensor light switches;<sup>4</sup> mounting the switch at a height 48" from the ground; or even retrofitting a switch with an light switch extender<sup>5</sup> (a 14" down rod reduces distance of switch from the floor). Illuminated rocker switches are preferred over toggle switches. Bathrooms should have low level night lighting for safety. The use of LED lighting around the door<sup>6</sup> or faucet<sup>7</sup> and under the mirror provides a better definition of the space, as



opposed to nightlights which often create dangerous shadows!

Flooring from typical tile can become slippery when wet, which is dangerous when transferring or handling persons after bathing. In following universal design principles, consider surfaces with a slight grit embedded in it. Armstrong Flooring has a 'Safeguard Spa Series' which provides traction with comfort.



Tubs and showers have long been the bane of anyone with accessibility issues. Consider these 2 options: 1) A shower stall with zero or ultra low threshold drain pan with no less than a 5' x 3' footprint, and/or frameless shower door. This eliminates the need to step up and over, or allows for a shower transfer chair to be wheeled right in. Adding a bench or fold-away shower seat<sup>8</sup> with a backrest and arms provides positioning support and stability. 2) A walk-in bath tub<sup>9</sup> allows individuals to walk-in with minimal stepping or to transfer in from a wheelchair. These often also provide warm, jetted water which is particularly useful for thorough cleansing and promoting good circulation.

If you do not have the luxury of being able to have either of these items, consider some other alternatives. An adjustable height shower head<sup>10</sup> that slides up and down is convenient for all sizes of family members. Good, solid grab bars should be installed professionally. Look for a slip resistant surface, with a diameter that can accommodate a wide variety of grip sizes and strengths. (If you are at the construction stage, have the builder add reinforcements in between the studs around the shower, tub, and toilet) Placing 2 sets of grab bars at varying heights or one mounted diagonally will allow an individual to use one to get into the tub, and the other to get out. Consider one of the new tub transfer systems<sup>11</sup> allowing individuals to use water power to be raised and lowered into the tub. For the toilet, in addition to grab bars, the installation of a bidet spa is a good bet for all individuals. The design of the Clean Butt bidet spa (yes, that is the real name!!)<sup>12</sup> will not only assist with hygiene in front and back, but will also promote elimination as well as save a caregiver's back! Consider an extra tall toilet or a toilevator<sup>13</sup> (raises height of toilet by 3.5"). This is less obtrusive than adding an extra high toilet seat to the top of the toilet. The extra height helps persons transferring from wheelchairs or those who can't lower to a seated position in a smoothly controlled manner. Touchless or Automatic flushing toilets have come down in price, and provide a significant level of independence; as do other automatic fixtures such as: faucets<sup>14</sup> and soap dispensers. You can even find styles that run off of batteries if wiring cannot be provided. If these are

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not an option, consider faucets with lever style handles to be a good alternative.

While looking at the fixtures for the sink, universal design can address all of the family's needs. Motorized, height adjustable sinks <sup>15</sup> and counters allow for seated individuals to tend to their needs as readily as those who stand while completing activities of daily living. If that isn't in the budget, simply eliminate the base cabinet under the sink to allow for a wheelchair or chair to be placed underneath. Be sure to box in the plumbing to prevent contact with hot pipes, and always remember that all fixtures (faucets and shower heads) should be outfitted with an anti-scald device.



In the kitchen, zero transition and non skid flooring, as well as ambient night lighting and focused lighting are a must! Refer to the bathroom section for suggested flooring, transition and lighting information. For full accessibility, a 48" minimal clearance is needed between the face of the cabinets and other cabinets or walls, for wheelchair or walker maneuvering. Up to 60" of clearance in the corner is needed if you have a "U" or "T" shaped space. Cabinet toe kicks 9" high and 6" deep raise the cabinetry and allow for easy passage for wheelchair users.

Designing or retrofitting a kitchen that meets the needs of as many users as possible regardless of age or physical attributes, is clearly the concept of UD. Base cabinets and pantries are now available from most manufac-



tures with full-extension pull out drawers <sup>16</sup> and shelves for easy access to stored foods, pots and pans and light appliances while reducing bending and lifting. Retrofit existing cabinets with drawer systems such as those available through G-O Manufacturing, LLC for 100% accessibility.<sup>17</sup> For the ultimate in upper cabinet access, consider pull down mechanisms <sup>18</sup>

that bring the shelves down to the user or a remote system<sup>19</sup> that moves the entire cabinet up or down.

When considering the work surface, electrically powered or mechanically adjustable height counter segments (28"- 42") by AD-AS<sup>20</sup> with cook tops and/or sinks and disposal units would accommodate all the chefs in your home. For non adjustable units, include a knee space under the sink or cook top (29" high minimum) for use in a seated position. Additional adjacent work space should be flush with appliances for food removal and preparation. Cantilevered or variable height counter tops provide preparation space for all. Like with flooring,

minimize the transitions from the cook top to the counter. When retrofitting, you could remove the base cabinet, or install fold back, bi-fold doors. Remember, pipe protection panels prevent contact with hot or sharp objects. Adding a color contrasting border treatment on the front edge of the countertops is not only attractive, but allows for easy recognition of heights and prevents spills. Providing stretches of continuous countertops for sliding of heavy items is especially helpful between the refrigerator, sink and stove for those with limited strength.

Cabinet hardware and plumbing fixture rules should remain consistent throughout your home. Family members with limited grasp, flexibility or strength who cannot handle knobs find push plates, magnetic or touch latches and loop style hardware ideal for accessing kitchen cabinetry <sup>21</sup> (or any other cabinetry for that matter). Universal Design faucets give new meaning to style! Kohler Karbon™ Articulating faucets<sup>22</sup> put water anywhere you want it with ease. Anti-scald single lever style faucet handles also provide ease of use along with extra long spray hoses that let you fill pots with water on the stove without having to lift the pots. Just want to retrofit? The EZ Faucet by iTouchless <sup>23</sup> mounts onto your existing faucet making it fully automated for turning water on and off and easy to control water temperature and flow.

ALL appliances should be ADA compliant with front mounted controls. Safety and accessibility are paramount! Side by Side refrigerators with roll out shelves make reaching food pushed to the back more accessible. Dishwashers mounted on a platform or drawer unit making the top rack flush with the adjacent counter reduces bending and lifting from the lower rack. Built in ovens with a large view window can be mounted at counter height or under the counter for ease of access and monitoring. Consider installing a microwave under the counter for seated users or on the counter for those with difficulty in reaching. Touch Free accessories are not only popular but chic and stylish too. Touch Free trashcans,<sup>24</sup> countertop paper towel dispensers,<sup>25</sup> faucets, and soap dispensers offer hands free motion sensor driven systems.

For a total family dining experience, consider an adjustable height dining table <sup>26</sup> or a multi-level counter breakfast bar. Retrofitting an existing dining room table is easy with any number of commercially available adjustable table bases.

## BEDROOM AND LIVING ROOM

A person's bedroom and living room should be their sanctuary. Their spot to get away, regroup and re-energize. This is difficult to do if once you reach your room, you can do nothing independently. Fortunately the advancement of technology has allowed us to bring access to individuals, beyond the mere clap on/clap off lights. Independence can be met through programming a multi-function remote, <sup>27</sup> allowing lights, TV, stereo, iPod player, DVR, etc., to be operated from a single

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device. An extra large sized keypad remote can help with vision and fine motor control. Just want to sit and read? Convert any standard lamp into a touch lamp with a Universal Touch Lamp Socket Dimmer from Westek. **28**



X10 technology can be used to take this a step further, allowing for your child's bedroom to be outfitted with a "brain". You can personalize features for morning and night time routines such as lights or radios sequences for waking up; going to bed; turning on the computer, etc. Installing electronically opening blinds or curtains will allow your child to determine when they want privacy or when they want to let the sunshine in! Once all the furniture is in place, make sure there is ample maneuvering space- at least 36 inches on both sides of the bed or between the sofa and other chairs or tables, and ideally 60 inches on one side of the bed. Use adjustable height closet rods or install rods reachable from a seated or standing position. For children with poor fine motor control, memory, or vision issues, telephones with a large key pad, voice activated or speed dial preset afford them

independence while chatting with their friends.

Whether you are designing a new home, or remodeling your existing abode, remembering to add features like these will allow access for almost all family members, regardless of age, size or ability level- thus embodying the spirit of universal design! ■

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*Rochelle Hamilton, OTR/L ATP is an occupational therapist and a RESNA credentialed assistive technology practitioner. She has 30 years of combined experience working in school aged practice, Aging in Place Home Health Care and in Mental Health. This fall she looks forward to completing her M.Ed with a concentration in Assistive Technology from George Mason University. She is currently a school age OT practitioner for Prince William County Public Schools, VA and provides elderly Home Health Care Services in Manassas, VA.*

## RESOURCES

1. [www.homedepot.com](http://www.homedepot.com)
2. [www.opensesame.com](http://www.opensesame.com)
3. [www.homedepot.com](http://www.homedepot.com)
4. [www.lifehome.com/products/1033.asp](http://www.lifehome.com/products/1033.asp)
5. [www.sammonspreston.com/app.aspx?cmd=searchResults&s=light+switch+extender](http://www.sammonspreston.com/app.aspx?cmd=searchResults&s=light+switch+extender)
6. [findarticles.com/p/articles/mi\\_m3830/is\\_9\\_54/ai\\_n15680770?tag=artBody;col1](http://findarticles.com/p/articles/mi_m3830/is_9_54/ai_n15680770?tag=artBody;col1)
7. [http://store.twistedgrins.com/storefrontprofiles/deluxeSFshop.aspx?sfid=105990&c=0&search\\_text=LED+faucet+light](http://store.twistedgrins.com/storefrontprofiles/deluxeSFshop.aspx?sfid=105990&c=0&search_text=LED+faucet+light)
8. [www.accessible-shower-chairs.com](http://www.accessible-shower-chairs.com)
9. [www.ablewalkintubs.com](http://www.ablewalkintubs.com)
10. [www.homedepot.com](http://www.homedepot.com)
11. [www.ameriglide.com/item/ameri-bath-lift.html](http://www.ameriglide.com/item/ameri-bath-lift.html)
12. [www.cleanbutt.com](http://www.cleanbutt.com)
13. [www.cleanbutt.com](http://www.cleanbutt.com)
14. [automaticfaucets.com](http://automaticfaucets.com)
15. [universal-design-products.com](http://universal-design-products.com)
16. [www.glideout.com](http://www.glideout.com)
17. [www.hafele.com](http://www.hafele.com)
18. [www.ad-as.com/kb/approach\\_cook.htm](http://www.ad-as.com/kb/approach_cook.htm) adjustable work surfaces for kitchen
19. [wwhardware.com/index.cfm/pageid/2](http://wwhardware.com/index.cfm/pageid/2)
20. [www.us.kohler.com/faucets/karbon/index.jsp](http://www.us.kohler.com/faucets/karbon/index.jsp)
21. [www.itouchless.com/share/cgi-bin/site.cgi?site\\_id=itouchless&page\\_id=ezaucet](http://www.itouchless.com/share/cgi-bin/site.cgi?site_id=itouchless&page_id=ezaucet) touchless faucet retrofit
22. [www.itouchless.com/share/cgi-bin/site.cgi?site\\_id=itouchless&page\\_id=nx](http://www.itouchless.com/share/cgi-bin/site.cgi?site_id=itouchless&page_id=nx) touchless trashcan
23. [www.itouchless.com/share/cgi-bin/site.cgi?site\\_id=itouchless&page\\_id=towelmatic](http://www.itouchless.com/share/cgi-bin/site.cgi?site_id=itouchless&page_id=towelmatic) touchless paper towel dispenser

24. [www.spacetables.com/din\\_adjustable\\_base.html](http://www.spacetables.com/din_adjustable_base.html)
25. [www.bestbuy.com](http://www.bestbuy.com)
26. [www.galesburgelectric.com/Westek-6603B-Touchtronic-Universal-Touch-Lamp-Socket-Dimmer-p-5826.html](http://www.galesburgelectric.com/Westek-6603B-Touchtronic-Universal-Touch-Lamp-Socket-Dimmer-p-5826.html)
27. [www.x10.com/homepage.htm](http://www.x10.com/homepage.htm)
28. <http://hunterdouglas.com>

## ADDITIONAL RESOURCES AND REFERENCES

- Adaptive Access Company  
[www.adaptiveaccess.com/home\\_changes.php](http://www.adaptiveaccess.com/home_changes.php)
- AskToolTalk.com  
[www.asktooltalk.com/articles/construction/accessibility/accessibile\\_bathrooms.php](http://www.asktooltalk.com/articles/construction/accessibility/accessibile_bathrooms.php) (*Checklist for looking at your current home*)
- Charles Schwab Architects and Schwab Publishers  
[www.universaldesignonline.com/universalkitchens.html](http://www.universaldesignonline.com/universalkitchens.html) (*blue prints and schematics of UD kitchen designs*)
- Lowes  
[www.lowes.com/lowes/lkn?action=howTo&p=CommLib/UnivDesDef.html](http://www.lowes.com/lowes/lkn?action=howTo&p=CommLib/UnivDesDef.html) (*offers many UD and ADA compliant items*)
- Practical Guide to Universal Home Design  
[www.uiowa.edu/infotech/universalthomedesigntext.htm](http://www.uiowa.edu/infotech/universalthomedesigntext.htm) (*tips for remodeling, buying and building a home*)
- The BidetShop  
[www.cleanbutt.com](http://www.cleanbutt.com) (*Premier bidet spa; informational website*)
- The Center for Universal Design  
<http://design.ncsu.edu/cud> (*The go-to source for Universal design*)
- 8. This Old House online  
[www.thisoldhouse.com/toh/photos/0,,20199490,00.html](http://www.thisoldhouse.com/toh/photos/0,,20199490,00.html) (*14 Very universal design tips*)
- Universal Design Products  
[www.universal-design-products.com](http://www.universal-design-products.com) (*Go-to retailer in the USA*)