Universal Design Living Laboratory: A Case Study

New York School of Interior Design
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Universal Design in the Entry, Kitchen and Bathroom
The following list of Universal Design features can be easily incorporated into any new home from production development to luxury. It is important to note that almost none of the features are prohibitively high in cost and that a builder does not have to do this all or nothing. Adapting any of these features would be a step in the right direction.

The Entries

- No thresholds at any door
- 36" wide doors
- Lighting for safety and access
- Mail drop for easy access
- Weather shielded
- High visibility house address numbers
- Grade level to the entrance
- Sloped garage floor
- Use sloping walks, earth berms, retaining walls, bridges, or porches instead of obtrusive front ramps
- Package shelf or bench outside the door
- Full-length sidelight(s) at entry or window in door to see visitors
- 5' x 5' level maneuvering space (turning circle) on both sides of door

The Kitchen

- Sufficient clear floor space for work/traffic flow
- Circulation routes 40" wide at a minimum, to get to the kitchen
- No thresholds at any door
- 36" wide doors with lever handles
- Easy to roll on hard surface flooring
- Strategically placed visual barriers to kitchen mess
- Point of use storage
- Open/visible storage; flexible pantry storage
- Flexible base storage allowing for use as knee space
- Single lever faucets, mounted on the side of a low profile sink
- Pot filler at cooktop if sink is not close by
- Garbage disposer mounted in the rear of the sink allowing for knee space under the sink
- Pulls, rather than knobs on cabinets and drawers
- Counter tops at a variety of common heights: 30", 34", 36", and 42"

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- Roll-out full extension shelves and drawers in lower cabinets
- Hardware to lower contents stored in wall cabinets
- Toe kick area at the base of lower cabinets: 9-10” high
- Glass doors or open shelves in upper cabinets
- Vertical (pantry style) cabinets for most used items
- Waste and recycling container on pull-out drawers in lower cabinets
- Side by side refrigerator/freezer (prefer 24” deep) w/ full extension shelves
- Safety shut-offs and dual cueing (where available) on appliances
- Pull-out step stool
- Roll-out carts
- Contrasting edge on counter and flooring to define spaces, transitions and edges
- Varied light sources and adjustable controls
- Built-in desk
- Computer access
- Side hinged doors on oven and microwave at counter height or lower
- Raise dishwasher to 42”
- Side-by-side refrigerator
- Front-mounted controls on all appliances (Ex. cooktop, oven), with easy to read print
- Knee space under sink and cooktop
- 5’ turning radius in working areas
- Pull out spice and towel racks
- Contrasting edge on counter and flooring
- Electrical wall outlets 18” above the floor
- Electrical outlets and controls within reach Ex. Garbage disposer, range hood ventilation
- Varied light sources (mix of fluorescent and incandescent/halogen with similar color temperatures)
- Under cabinet lighting: linear T5 fluorescent, low profile so as not to protrude below cabinet trim, well shielded (diffuse lens), good color (choose bulbs with a color rendering index, good distribution, located at front of cabinet with lens facing backsplash
- Adjustable controls, i.e. dimmer switches
- Light switches should have rocker switch, and be located within easy reach of user, (not back wall!) 42-48” off the floor
- Preset control system option – allows you to set varying light levels according to room or task
- Important to note – California’s Title 24 requires that 50% of wattage in kitchen must be high efficiency, i.e. fluorescent; all other hardwired fixtures that are not fluorescent throughout the house must be either dimmable or on a manual on occupancy sensor

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The Bathroom

- No-threshold entries
- 36” wide doors with lever handles and/or pocket doors
- Circulation routes 40” wide at a minimum, to get to the bathroom
- Sufficient clear floor space for functional passage
- 5’ turning radius in key areas
- Point of use, easily accessed storage
- Multiple-height vanities with flexible knee spaces under the sink
- Toe kick area at the base of lower cabinets: 9-10” high
- Increased use of support rails and grab bars in the toileting, shower and tub areas that compliment the aesthetics
- Optional heat in the floor and towel warmers
- Anti-scald fittings on tub and shower
- Non-slip flooring
- Controls for windows, lighting and fixtures that are easy to operate
- Electrical outlets and controls within reach
- Full length mirror
- Vanity mirror at height for a seated person or able to tilt to adjust
- Flush threshold shower
- Shower designed for transfer (36” wide by 36” deep minimum) or roll in (36” wide by 48” deep minimum) depending on entry
- Shower chair or bench
- Easy maintenance, i.e. showerheads and whirlpool tubs with self-cleaning features
- Increased lighting from varied sources with adjustable controls
- Special design door for access to water closet
- Pocket doors may be a better alternative
- Hand-held shower spray on a sliding vertical bar, with 60” long hose
- Water controls within reach of person seated in the shower
- Tub deck with 15” extension for easier entry
- Tub with non-slip bottom
- Comfort-height toilets 17-19” from the floor
- If toilet is compartmentalized, provide option to open up
- Increased lighting from varied sources with adjustable controls
- Provide sufficient, well shielded lighting along either side of vanity mirror to eliminate shadows while grooming
- Provide moderate light level for wayfinding and orientation from bed to bathroom during the night
- Light switches should have rocker switch, and be located within easy reach of user, (not back wall!) 42-48” off the floor
- Electrical wall outlets 18” above the floor

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The Principles of Universal Design

Definition of Universal Design: *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.*

The authors, a working group of architects, product designers, engineers and environmental design researchers, collaborated to establish the following Principles of Universal Design to guide a wide range of design disciplines including environments, products, and communications. These seven principles may be applied to evaluate existing designs, guide the design process and educate both designers and consumers about the characteristics of more usable products and environments.

The Principles of Universal Design are presented here, in the following format: name of the principle, intended to be a concise and easily remembered statement of the key concept embodied in the principle; definition of the principle, a brief description of the principle's primary directive for design; and guidelines, a list of the key elements that should be present in a design which adheres to the principle. (Note: all guidelines may not be relevant to all designs.)

PRINCIPLE ONE: Equitable Use
The design is useful and marketable to people with diverse abilities.

- Provide the same means of use for all users: identical whenever possible; equivalent when not.
- Avoid segregating or stigmatizing any users.
- Provisions for privacy, security, and safety should be equally available to all users.
- Make the design appealing to all users.

PRINCIPLE TWO: Flexibility in Use
The design accommodates a wide range of individual preferences and abilities.

- Provide choice in methods of use.
- Accommodate right- or left-handed access and use.
- Facilitate the user's accuracy and precision.
- Provide adaptability to the user's pace.

PRINCIPLE THREE: Simple and Intuitive Use
Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

- Eliminate unnecessary complexity.
- Be consistent with user expectations and intuition.
- Accommodate a wide range of literacy and language skills.
- Arrange information consistent with its importance. Provide effective prompting and feedback during and after task completion.

PRINCIPLE FOUR: Perceptible Information
The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

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- Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information.
- Provide adequate contrast between essential information and its surroundings. Maximize "legibility" of essential information.
- Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions).
- Provide compatibility with a variety of techniques or devices used by people with sensory limitations.

PRINCIPLE FIVE: Tolerance for Error
The design minimizes hazards and the adverse consequences of accidental or unintended actions.

- Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded.
- Provide warnings of hazards and errors.
- Provide fail safe features.
- Discourage unconscious action in tasks that require vigilance.

PRINCIPLE SIX: Low Physical Effort
The design can be used efficiently and comfortably and with a minimum of fatigue.

- Allow user to maintain a neutral body position
- Use reasonable operating forces.
- Minimize repetitive actions.
- Minimize sustained physical effort.

PRINCIPLE SEVEN: Size and Space for Approach and Use
Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

- Provide a clear line of sight to important elements for any seated or standing user. Make reach to all components comfortable for any seated or standing user.
- Accommodate variations in hand and grip size.
- Provide adequate space for the use of assistive devices or personal assistance.

Please note that the Principles of Universal Design address only universally usable design, while the practice of design involves more than consideration for usability. Designers must also incorporate other considerations such as economic, engineering, cultural, gender, and environmental concerns in their design processes. These Principles offer designers guidance to better integrate features that meet the needs of as many users as possible.

Compiled by advocates of universal design, listed in alphabetical order:
Bettye Rose Connell, Mike Jones, Ron Mace, Jim Mueller, Abir Mullick, Elaine Ostroff, Jon Sanford, Ed Steinfeld, Molly Story, and Gregg Vanderheiden. Copyright 1997 NC State University, The Center for Universal Design

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Universal Design – Related Resources

Associations, Organizations, Corporations, Agencies

Abledata
800-227-0216
www.abledata.com

Access One
www.beyondbarriers.com

Adaptive Environments
617- 695-1225
www.adaptenv.org

AARP
www.aarp.org

Alzheimer's Association
800-272-3900
www.alz.org

Alzheimer's Disease Education & Referral Center
800-438-4380
www.alzheimers.org/

American Foundation for the Blind
AARP
888-687-2277
www.aarp.org

800-AFB-LINE
www.afb.org

American Heart Association National Center
800-AHA-USA-1
www.americanheart.org

American National Standards Institute
212-642-4900
www.ansi.org

American Occupational Therapy Association
www.aota.org

Center for Inclusive Design and Environmental Access (IDEA Center), University of Buffalo
716- 829-3485 Ext. 329
http://www.ap.buffalo.edu/idea/Home/index.asp

Center for Universal Design North Carolina State University
800-647-6777
www.design.ncsu.edu/cud

Charles Schwab Architects
309-792-4599
www.universaldesignonline.com

Concrete Change
In support of visitable homes
404-378-7455
www.concretechange.org

Council for Exceptional Children
888-CEC-SPED
www.cec.sped.org

Cystic Fibrosis Foundation
800-344-4823
www.cff.org

Disabled American Veterans
202-554-3501
www.dav.org

Disability Rights Education Defense Fund
202-986-0375
www.dredf.org

Draware (Ireland)
http://www.ucd.ie/avc/DraWare/default.htm

Easter Seal Society
312-726-6200
www.easter-seals.org

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American Stroke Association National Center
888-4-STROKE
www.strokeassociation.org

Area Agencies on Aging
www.aog.dhhs.gov/agingsites/state.html

Amputee Coalition of America
888-AMP-KNOW
www.amputee-coalition.org/

Arthritis Foundation
800-283-7800
www.arthritis.org

CAST
www.cast.org

Home Modification List Serve
Homemodification-list@listserv.acsu.buffalo.edu

Independent Living Research Utilization Project
713-520-0232
www.ilru.org

Institute on Independent Living (Sweden)
www.independentliving.org

Lifease
www.lifease.com

Lighthouse International
800-829-0500; 212-821-9713 TTY
www.lighthouse.org

Muscular Dystrophy Association
800-572-1717
www.mdausa.org

National Association of the Deaf
301-587-1788; 301-587-1789 TTY
www.nad.org

National Center for Accessible Media
www.ncam.wgbh.org

EasyLiving Home
www.easylivinghome.org

Eldercare Locator
800-677-1116
www.eldercare.gov

European Concept for Accessibility
(Luxembourg)
www.eca.lu

European Institute for Design and Disability
www.design-for-all.org

Harris Communications, Inc.
www.harriscomm.com

National Resource Center on Supportive Housing and Home Modifications
Andrus Gerontology Center, University of Southern California
213-740-1364
www.homemods.org

National Rehabilitation Information Center
800-346-2742
www.naric.com

Paralyzed Veterans of America
800-424-8200
www.pva.org

ProMatura
www.promatura.com

Regional ADA technical assistance
800-949-4232
www.adata.org

Rehabilitation Engineering and Assistive Technology Society of North America
(RESNA)
703-524-6686
www.resna.org

Trace Research and Development Center
University of Wisconsin
www.trace.wisc.edu

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National Council on Independent Living
703-525-3406; 703-525-4153 TYY
www.ncil.org

National Institute on Aging
301-496-1752
www.nia.nih.gov/

National Institute on Deafness and Other Communication Disorders
National Institute of Health
301-496-0252
www.nidcd.nih.gov

National Institute on Disability and Rehabilitation Research
US Department of Education
202-205-8134; 202-205-4475 TYY
www.ed.gov

National Endowment for the Arts
www.arts.endow.gov

National Kitchen & Bath Association
908-843-6522
www.nkba.org

Universal Design Alliance
770-667-4593
www.universaldesign.org

Universal Design Education Online
http://www.udeducation.org/

Universal Designers & Consultants
301-270-2470
www.universaldesign.com

United Spinal Association
718- 803-3782
www.unitedspinal.org

U.S. Access Board
800-872-2253; 800-993-2822 TTY
www.access-board.gov

U.S. Dept. of Housing and Urban Dev.
Tech. assist. on Section 504 &
Fair Housing
800-827-5005
Publications Center: 800-767-7468
www.hud.gov/fhe/fheo.html

U.S. Dept. of Justice
Technical Assistance on ADA
800-514-0304, 800-514-0383 TTY
www.usdoj.gov/crt/ada/adahom1.htm

U.S. Dept. of Veterans Affairs
Home Loan Guaranty Services
www.homeloans.va.gov/

Visitability List Serve
visitability-list@ACSU.buffalo.edu

Volunteers for Medical Engineering
2201 Argonne Drive
Baltimore, MD 21218
http://www.toad.net/~vme/

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Universal Design Resources - Printed Materials

"Universal Kitchen and Bathroom Planning: Design That Adapts to People", Mary Jo Peterson, McGraw-Hill Professional Publishing, 1998

"Universal Interiors by Design: Gracious Spaces", Mary Jo Peterson and Irma Dobkin, McGraw-Hill, 1999

"Beautiful Universal Design: A Visual Guide", Cynthia Leibrock, James Terry, James Evan Terry, Wiley John & Sons, 1999

"Universal Design "Smart" Homes for the 21st Century: 102 Home Plans You Can Order and Build", Charles Schwab, 2005

"Products and Plans for Universal Homes", Home Planners, LLC, 2000

"Universal Design Handbook", Wolfgang Preiser and Elaine Ostroff, editors; McGraw-Hill, 2001

"The Universal Design File: Designing for People of All Ages and Abilities", Molly Story, James Mueller, Ronald Mace, The Center for Universal Design, 1998

"Residential Remodeling and Universal Design: Making Homes More Comfortable and Accessible", U. S. Department of Housing and Urban Development, 1996

"Directory of Accessible Building Products", NAHB Research Center, 2005

"Elder Design: Designing and Furnishing a Home for Your Later Years", Rosemary Bakker, Penguin Group, 1997

"Building for a Lifetime: The Design and Construction of Fully Accessible Homes", Margaret Wylde, Adrian Baron-Robbins and Sam Clark, Taunton Press, 1994

"The Accessible Housing Design File", Barrier Free Environments, Inc., John Wiley & Sons, 1991

"Accessible Home Design: Architectural Solutions for the Wheelchair User" Second Edition, Thomas D. Davies and Carol Peredo Lopez, Paralyzed Veterans of America Distribution Center, 2006

"Universal Design", Selwyn Goldsmith, Architectural Press, 2001

"The Accessible Home: Updating Your Home for Changing Physical Needs", Creative Publishing International, 2003

"High Access Home : Design and Decoration for Barrier-Free Living", Charles A. Iii Riley, Rizzoli Universe Promotional Books, 2003

"Universal Design: Creative Solutions for ADA Compliance", Roberta L. Null, Professional Publications Inc, 1998

"Fair Housing Act Design Manual", Barrier Free Environments, Inc., 1998

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"A Basic Guide to Fair Housing Accessibility: Everything Architects and Builders Need to Know About the Fair Housing Act Accessibility Guidelines", Steven Winter Associates, Inc., John Wiley & Sons, 2001

"Enabling Garden: Creating Barrier-free Gardens", Gene Rothert, Taylor Publishing Co., 1994

"AARP Beyond 50.03", A Report to the Nation on Independence and Disability, AARP, 2003

"We the People: Aging in the United States", Census 2000 Special Reports, Issued December 2004

"Fixing to Stay", A National Survey of Housing and Home Modification Issues, AARP, May 2000

"A Quiet Crisis in America", The Report to Congress by the Commission on Affordable Housing and Health Facility Needs for Seniors in the 21st Century, June 30, 2002

"Aging in Place, Coordinating Housing and Health Care Provision for America's Growing Elderly Population ", The Harvard University Joint Center on Housing Studies in conjunction with the Neighborhood Reinvestment Corporation report entitled, October 2001

"Aging in Place – Aging and the Impact of Interior Design", American Society of Interior Designers, 2001

"Living Independently in Your Later Years", A special report of the Harvard Medical School, Harvard Health Publications, 2002

"Aging in Place- Solutions to a Crisis in Housing and Care", Neighborhood Reinvestment Corporation, August 2002

"Using Your Home to Stay at Home", National Council on Aging, 2004

Checklists, related resources and universal design resources compiled with the assistance of Mary Jo Peterson, www.mjpdesign.com.

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