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reSearch

A collection of research reviews on rehabilitation topics from NARIC and other information resources.

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Universal Design: Architecture and Visitability

RESNA 2008, the largest rehabilitation engineering and assistive technology conference in the United States, opens June 27th in Crystal City, VA. We selected the topic of universal design, with a focus on architecture and "visitability," highlighting research from the last ten years. Universal Design Education Online, a NIDRR project, defines universal design (UD) as "an approach to the design of all products and environments to be usable by everyone, to the greatest extent possible, regardless of age, ability, or situation."(www.udeducation.org/learn). When applied to architecture and the built environment, this means designing and building everything from bathrooms, to playgrounds, to large multi-use structures, to be usable by anyone.

Recent editions of *reSearch* explored the disability rights movement and its effects on persons with disabilities, community living, legislation, and rehabilitation. UD is intimately connected to the disability rights movement, emerging from the early accessibility barriers legislation including the Architectural Barriers Act of 1968, the Rehabilitation Act of 1973, and the Fair Housing Amendments Act.

The Individuals with Disabilities Education Act, the Americans with Disabilities Act, and the Telecommunications Act were also instrumental in furthering UD, expanding the concept beyond physical and architectural environment. UD now includes, but is not limited to, website design, retail product development, information technology, and educational and workspace environments that promote full inclusion of people with and without disabilities. Developments in UD not only address the accessibility needs of persons with disabilities; they promote creativity, affordability, reduction of stigmatization, attractiveness, and marketability for products designed for all individuals.[1]

According to the Universal Design Education Online website, there are seven basic principles of UD. These seven principles were formulated by "…a working group of architects, product designers, engineers, and environmental design researchers as part of a project coordinated by the Center for Universal Design at North Carolina State University."

The seven universal design principles are:

1. Equitable Use
2. Flexibility in Use
3. Simple and Intuitive Use
4. Perceptible Information
5. Tolerance for Error
6. Low Physical Effort Size
7. Space for Approach and Use

(Retrieved from www.udeducation.org/learn/aboutud.asp).

While there are many facets to UD, in this edition of *reSearch* we explore the research in universal design from an architectural perspective over a 10-year period. Our main search terms included universal design, architecture, barriers, accessibility, accommodation, education, engineering, modification, facilities, and others. A listing of approximately 115 additional descriptor terms between the NARIC, ERIC, and PubMed databases can be found at the end of this document. A search of the REHABDATA database resulted in 40 documents published between 1998 and 2008. The ERIC database search resulted in 13 documents through 1998 and 2005. Finally, a search of PubMed resulted in seven documents published between 2003 and 2007. The complete citations are included in this research brief.

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[1] About UD: Universal Design History. North Carolina State University, College of Design, Center for Universal Design. Retrieved 4/23/2008 from www.design.ncsu.edu/cud/about_ud/udhistory.htm.

NIDRR Funded Projects Related to Architecture and Universal Design

In addition to document searches, we searched our NIDRR Program Database to locate grantees/projects related to architecture and universal design. The search resulted in nine NIDRR funded projects—five currently funded and four no longer active. Project information and their publications are offered as additional resources for our patrons.

Inclusive Indoor Play
Project Number: H133G040324
Phone: 404/385-7210

Rehabilitation Engineering and Research Center (RERC) on Universal Design and the Built Environment at Buffalo
Project Number: H133E050004
www.ap.buffalo.edu/idea/rercud.asp

Rehabilitation Engineering Research Center on Workplace Accommodations
Project Number: H133E020720
www.workrerc.org

Universal Access to Passenger Rail
Project Number: H133S050136
www.marshallelevator.com

Universal Design of Tactile Exhibits with Touch Activated Descriptive Audio for Aquariums
Project Number: H133G060284
Phone: 336/722-4250

The following are previously funded NIDRR projects. For more information please visit the NIDRR Project Database at www.naric.com/research/pd/default.cfm.

Access Solutions
Project Number: H133G60046 (no longer active)

Rehabilitation Engineering Research Center (RERC) on Universal Design and the Built Environment at NCSU
Project Number: H133E990002 (no longer active)
www.design.ncsu.edu/cud

Studies to Further the Development of Universal Design
Project Number: H133A40006 (no longer active)
www.design.ncsu.edu/cud

Understanding and Increasing the Adoption of Universal Design in Product Design
Project Number: H133A60030 (no longer active)
trace.wisc.edu

Documents from NARIC's REHABDATA search listed are listed below:

2008

Cummings, Susan; Oreskovich, Joanne; Ravesloot, Craig; Seekins, Tom; & Traci, Meg, A. (2008). **Assessing environmental factors that affect disability: Establishing a baseline of visitability in a rural state.** *Rehabilitation Psychology, 53*(1), 80-84.
NARIC Accession Number: J53926
ABSTRACT: A visitability question was included in the 2004 Montana Behavioral Risk Factor Surveillance System Questionnaire, a random telephone survey of 5,005 adults in Montana, to establish a baseline rate of basic home visitability in a rural state. The concept of visitability describes features of private homes that provide a minimal level of accessibility, allowing people with mobility impairments to visit the homes of family and friends. Nearly 20 percent of respondents said that "a person who uses special equipment such as a wheelchair . . . could get into [their] house without being carried up steps or over other obstacles." Respondents with a disability who reported living in a visitable house were less likely than those who did not live in a visitable house to report any days of poor mental health in the past month.

2007

(2007). ***Grocery check-stand design: Guidelines and resources.***
NARIC Accession Number: O17092 – [PDF available on NARIC website]
Abstract: This illustrated guide provides information that can be used to design, develop, test, refine, and evaluate retail grocery check-stands designed to maximize independence and participation of people with disabilities in the workplace. Better design in grocery check-stands has the potential to reduce injury, decrease training time, decrease employee turnover, increase accessibility, increase productivity, increase diversity of possible employees, and improve the overall experience of employees and customers.

Gulatee, Ramesh. (2007). **Creating accessible homes: A checklist for accessibility.** *Exceptional Parent, 37*(11), 52-54.
NARIC Accession Number: J53609

Abstract: This article is the second in a three-part series of home improvement articles. It highlights home situations discussed in the July issue article (see accession number J52945) and identifies accessibility issues and possible solutions. Areas of concern include home style, home/house entry, porches, hallways, kitchens, bathrooms, and closets.

2006

DiMento, Joseph, F.C.; Geis, Gilbert; Kaminshi, Scott, E.; & Mazumdar, Sanjoy. (2006). **The viability of voluntary visitability: A case study of Irvine's approach.** *Journal of Disability Policy Studies, 17*(1), 49-56.
NARIC Accession Number: J50769
ABSTRACT: Article describes the development of policies regarding the concept of visitability in the city of Irvine, California. Visitability refers to having residences that accommodate the needs of people with disabilities, especially those using wheelchairs, to enable them to visit relatives, friends, neighbors, and others. Case report discusses the consideration of, opposition to, concerns and doubts about, activists' response to, developers' and builders' actions, and results of the visitability policies.

Grubbs, R.L.; & Ringholz, David. (2006). **Critical processes in the universal design of grocery retail workstations: Applying the CATEA process model for product design partnerships.** *29th Annual RESNA Conference Proceedings.*
NARIC Accession Number: O16673
ABSTRACT: Paper provides an overview of critical human centered design (HCD) processes used in design and development of universally designed grocery retail workstations. These critical processes include cultivating and nurturing product design partnerships, conducting primary and secondary market research and analysis, engaging stakeholders, conducting research and evaluation studies, sampling and recruitment, collecting and analyzing data, designing prototypes, and refining and testing. A brief overview is provided regarding these critical processes and how they have emerged from the Center for Assistive Technology and Environmental Access (CATEA) Process Model for Product Design Partnerships, HCD processes, and practices of technology transfer. This paper was presented at the 2006 annual conference of the Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) and is available on CD-ROM.

Gulatee, Ramesh. (2006). **Designing your accessible home: Working with a specialized architect.** *Exceptional Parent, 36*(7), 26.
NARIC Accession Number: J51091
ABSTRACT: Article offers advice for hiring an architect who specializes in designing residential housing according to the Americans with Disabilities Act's accessibility guidelines.

Karlin, Bradley, E.; & Zeiss, Robert, A. (2006). **Environmental and therapeutic issues in psychiatric hospital design: Toward best practices.** *Psychiatric Services (formerly Hospital and Community Psychiatry), 57*(10), 1376-1378.
NARIC Accession Number: J51552
ABSTRACT: Article reviews the literature on environmental and therapeutic issues related to, and identifies best practices in, psychiatric hospital design. The findings are classified into five categories: ambient features, architectural features, interior design features, social features, and specific issues.

Maisel, Jordana, L. (2006). **Toward inclusive housing and neighborhood design: A look at visitability.** *Community Development: Journal of the Community Development Society, 37*(3), 26-34.
NARIC Accession Number: J51461
Abstract: Article presents an overview of "visitability", a concept that describes affordable, sustainable, and accessible design for single family housing. Discussion focuses on the need for accessible housing, the origins of the visitability, its principles and goals, the number and diversity of visitability initiatives and programs, and obstacles to its adoption.

Menendez, Frank. (2006). **Access through architecture: Accessible classroom.** *PN/Paraplegia News, 60*(10), 20-26.
NARIC Accession Number: J51641
ABSTRACT: Article discusses the trend toward making university classrooms more accessible for people with disabilities. Universal design strategies for different types of classrooms and the use of audio-visual technologies are discussed.

2005

Deyer, Joshua, W. (2005). **Decoding accessible-design terms.** *PN/Paraplegia News, 59*(1), 24-28.
NARIC Accession Number: J48594

ABSTRACT: Article defines the terms visitability, accessibility, and universal design as they relate to architectural accessibility for wheelchair users and other people with disabilities.

Drill, Herb. (2005). **A closer look: A move toward accessible hotels.** *PN/Paraplegia News, 59*(1), 53-55.
NARIC Accession Number: J48595
ABSTRACT: Article describes the accommodations available for travelers with disabilities at Microtel Inns & Suites, Hawthorn Suites, and America's Best Inns & Suites. Discussion focuses on meeting guests' business needs, architectural accessibility, and the friendly attitudes of the staff.

2004

(2004). ***Practical guide to universal home design.***
NARIC Accession Number: O16601 – [PDF available on NARIC website]
ABSTRACT: Room by room, this booklet offers suggestions for universal design features to consider when remodeling, building, or buying a home. Universal design uses simple, proven ideas to make any home more comfortable for a wide range of people, including families with young children, older adults, people who want to simplify their housekeeping, people who are taller or shorter then average, and people who use wheelchairs or walkers.

(2004). ***Universal designed "smart" homes for the 21st century.***
NARIC Accession Number: R08482
ABSTRACT: Book includes 72 home plans that are based on the concept of universal design. Universal design is intended to make homes accessible and usable for all people of ages and abilities. The home plan designs include universal "smart" technologies that provide energy-saving construction and safety features.

Brennan, Lisa. (2004). ***Rural facts: Visitability.***
NARIC Accession Number: O15708
ABSTRACT: Fact sheet presents an overview of visitability, an approach to making all homes accessible to people with mobility impairments. It answers questions regarding what makes a home visitable; the number of homes that are visitable; issues related to safety, health status, and legislation; the value of visitable homes compared to nonvisitable homes; and the financial incentives for making a home visitable.

Shamberg, Shoshana. (2004). **It starts in the home.** *REHAB Management, 17*(7), 14-17, 42.
NARIC Accession Number: J48304
ABSTRACT: Article presents a list of common bathroom architectural accessibility problems that limit safety and comfort, as well as suggestions for simple modifications. Author describes the formation of Abilities Inc., which provides universal design and accessibility consultation services, and the concept of visitable homes.

2003

(2003). ***Focus: Technical brief number 8: Accessibility in our built environment: Visitability.***
NARIC Accession Number: O16302 – [PDF available on NARIC website]
ABSTRACT: This brief provides an overview of research projects funded by the National Institute on Disability and Rehabilitation Research (NIDRR) that are related to the evolving areas of universal design and visitability. NIDRR-supported projects cited in this issue include the Rehabilitation Engineering and Research Center (RERC) on Universal Design and the Built Environment at North Carolina State University, the RERC on Universal Design at Buffalo, and the Rehabilitation Research and Training Center on Independent Living Management at Buffalo. A list of resources from a variety of NIDRR-supported projects is included as a reference guide to information about universal design and visitability research.

(2003). ***Visit-ability: Making universal access to community life a reality.***
NARIC Accession Number: O15410
ABSTRACT: CD-ROM tutorial is designed to educate independent living center staff, volunteers, and other participants on visit-ability, an approach to making all residential property accessible to people with mobility impairments. This tutorial provides a basic understanding of the concept of visitability, including good practice examples, and cost estimates for visitable features. It describes advocacy strategies for developing visit-ability projects in local communities. Contact information for organizations that can assist in promoting them is also provided. This program is an adaptation of the booklet Visit-ability: An Approach to Universal Design in Housing (Accession Number O14382).

Clarke, Karen; Dewsbury, Guy; Edge, Martin; Rouncefield, Mark; Sommerville, Ian; & Taylor, Bruce. (2003). **Designing acceptable 'smart' home technology to support people in the home.** *Technology and Disability, 15*(3), 191-199.
NARIC Accession Number: J46837
ABSTRACT: Article examines the main aspects and questions that are significant in the design of "smart" homes. Smart homes are those that include technology to support independent living for older adults and people with disabilities. Four main areas of significance are covered: (1) primary design consideration, (2) general design of buildings and internal spaces, (3) residential structures, and (4) technology system specifications.

Davenport, Rick; Giraldo, Carlos; Helal, Sumi; Kaddoura, Youssef; Lee, Choonhwa; Mann, William; & Zabadani, Hicham. (2003). **Assistive environments for successful aging.** *In M. Mokhtari, ed., Independent living for persons with disabilities and elderly people, ICOST'2003: 1st International Conference on Smart Homes and Health Telematics. Assistive Techology Research Series, Volume 12*, IOS Press, 104-110.
NARIC Accession Number: J49309
ABSTRACT: Paper discusses research on building assistive environments to support successful aging. The Matilda Smart House project is described, along with its architecture, and a sample of its applications. The project integrates smart home technology with smart phones to create an effective environment that is able to assist older adults to live independently.

Graafmans, J.A.M.; & Ikonen-Graafmans, T.S.K. (2003). **The barrier-free suburb of Marjala in Finland: The city for all - the Marjala model.** *Technology and Disability, 15*(3), 201-204.
NARIC Accession Number: J46836
ABSTRACT: Article describes a demonstration project conducted in Marjala, the first barrier-free suburb built in Finland in 1995. The suburb was designed for lifelong living for all people: families with young children, for the elderly, for people with visual impairments or other disabilities. The planning instructions require that all homes, shared facilities, and connecting routes allow barrier-free access and complete mobility not only within each dwelling, but in the whole area. The development also incorporated accessible services and new information and communication technologies.

2002

Axelson, D.A.; Axelson, P.W.; Longmuir, P.E.; & Mispagel, K.M. (2002). **Enhanced quality of life through the application of universal design principles to outdoor recreation opportunities.** *In R. Simpson (ed.), Proceedings of the RESNA 25th International Conference: Technology and Disability: Research, Design, Practice and Policy (155-157).* Arlington, VA: RESNA Press.
NARIC Accession Number: O14505
ABSTRACT: Paper describes a process for applying the principles of universal design to outdoor, natural environments. This approach to accessibility can be used to identify and remove barriers, match trail design with user safety and environmental protection needs, and allow people with disabilities to enjoy outdoor recreation activities through the dissemination of accurate information. This paper was presented at the 2002 annual conference of RESNA, the Rehabilitation Engineering and Assistive Technology Society of North America.

Babbitt, Beatrice, C.; & Erandson, Robert, F. (2002). **The movement of accessible design principles into mainstream engineering: Now and then.** *In J.M. Winters, C. Robinson, R. Simpson, and G. Vanderheiden, eds., Emerging and Accessible Telecommunications, Information and Healthcare Technologies, (2-18).* RESNA Press: Arlington, VA, 2-18.
NARIC Accession Number: O15100
ABSTRACT: Chapter describes the driving and restraining forces affecting the movement of accessible design principles into mainstream engineering. Accessible (or universal) design refers to the use of ergonomic principles to design products and services so that as many people as possible, including those with disabilities, can access and use them. Driving forces include ethical considerations, federal and state laws mandating accessibility, market potential, accessible design approaches are simply good design, and growing awareness and increasing resources. Restraining forces include lack of awareness of federal and state laws, perceived expense in terms of money and resources, a lack of understanding of accessible design principles; a lack of awareness of the needs, issues, principles, and opportunities by college faculty; poor communications between the universities and industry and government; and prejudice and a lack of understanding of needs of people with disabilities. A case study demonstrates the effect of these

driving and restraining forces on the development of undergraduate engineering curriculum at the University of Nevada Las Vegas.

Bartlett, W.; Levine, D.; Smith, E.; Talboys, R.; &Yencer, R. (2002). ***Visit-ability: An approach to universal design in housing.***
NARIC Accession Number: O14382
ABSTRACT: Book presents an overview of visitability, an affordable and inclusive design approach for integrating basic accessibility features into all newly built homes and housing. Contact information for organizations that can assist in developing community visitability projects is provided.

Connell, B.R.; Jones, M.; Mace, R.; Mueller, J.; Mullick, A.; Ostroff, E.; Sanford, J.; Steinfeld, E.; Story, M.; & Vanderheiden, G. (2002). ***The principles of universal design.***
NARIC Accession Number: O14381
ABSTRACT: Describes seven principles that may be applied to assess existing designs, guide the design process, and educate designers and consumers about the characteristics of more usable products and environments. The principles are: (1) equitable use, (2) flexibility in use, (3) simple and intuitive use, (4) perceptible information, (5) tolerance for error, (6) low physical effort, and (7) size and space for approach and use.

Danford, G.S.; & Tauke, B., eds. (2002). ***Universal design: New York.***
NARIC Accession Number: R08256
ABSTRACT: Book presents design criteria and universal design guidelines for New York City architects and building developers. Contains examples that are intended to raise awareness about the value of universal design, show how universal design can be implemented, and encourage the adoption of universal design.

Higgins, Cindy. (2002). **Physically accessible housing.** *Research Information on Independent Living, 1*(9).
NARIC Accession Number: O15142 – [PDF available on NARIC website]
ABSTRACT: Paper briefly discusses guidelines for creating housing that is accessible for people with disabilities based on universal design features. Specifications for ramps, doors, and hallways are described.

Pace, R.J.; & Young, L. (2002). **Future housing now: The next generation universal home.** *In R. Simpson, ed., Proceedings of the RESNA 25th International Conference: Technology and Disability: Research, Design, Practice and Policy (149-151).* Arlington, VA: RESNA Press.
NARIC Accession Number: O14503
Abstract: Paper describes how houses will be designed in the future in response to changes in demographics and marketing trends. Authors discuss specific features and design elements that can be incorporated into every home based on the principles of universal design. This paper was presented at the 2002 annual conference of RESNA, the Rehabilitation Engineering and Assistive Technology Society of North America.

Young, Leslie C. (2002). **Universal design exemplars.** *In R. Simpson, ed., Proceedings of the RESNA 25th International Conference: Technology and Disability: Research, Design, Practice and Policy (146-148).* Arlington, VA: RESNA Press
NARIC Accession Number: O14502
ABSTRACT: Paper discusses the contents of an interactive CD-ROM that identifies, describes, and visually documents examples of universal design in the fields of architecture, landscape architecture, industrial design, interior design, and exhibit design. This paper was presented at the 2002 annual conference of RESNA, the Rehabilitation Engineering and Assistive Technology Society of North America.

2001

Axelson, P.W.; Longmuir, P.E.; & Mispagel, K.M. (2001). **TrailWare: Technology for the universal design of outdoor environments.** *In R. Simpson, ed., Proceedings of the RESNA 2001 Annual Conference: The AT Odyssey Continues (118-120).* Arlington, VA: RESNA Press.
NARIC Accession Number: O14167
ABSTRACT: Paper on the design and development of TrailWare, computer software to help in the creation of outdoor environments consistent with universal design principles. TrailWare can be used to analyze and summarize objective measurements of outdoor environmental conditions, and the resulting information can be used to design or modify the environment to maximize accessibility. This paper was presented at the 2001 annual conference of RESNA, the Rehabilitation Engineering and Assistive Technology Society of North America.

Bitterman, Alex. (2001). ***Unlimited by design.***
NARIC Accession Number: O15661
ABSTRACT: Video introduces the Unlimited by Design exhibition, an all-inclusive, universal approach to the design of everything from playgrounds to utensils in order to accommodate different user groups. This document is included in NCDDR's Guide to Resources Produced by NIDRR Grantees: Infants, Children, and Youth with Disabilities as K.1.

Christenson, M.A.; Holm, M.B.; & Mills, T. (2001). **Public opinion of universal design in housing.** *In R. Simpson, ed., Proceedings of the RESNA 2001 Annual Conference: The AT Odyssey Continues (112-114).* Arlington, VA: RESNA Press.
NARIC Accession Number: O14165
ABSTRACT: Study examining the views of the public about universal design (UD) in housing, based on a survey of visitors to the 2000 Parade of Homes Fall Showcase presented by the Builders Association of the Twin Cities in Minnesota. A total of 1656 visitors toured a residential house built with UD features and then completed a survey giving their views on the importance of UD features, the presence of UD features in their own homes, their interest in having UD features in future homes, their support of government policies to promote UD features, and the perceived effect of UD features on the resale value of a home. Results indicate that most participants believed it was important to include UD features in a home, and would consider including UD features in their current homes and retirement homes. This paper was presented at the 2001 annual conference of RESNA, the Rehabilitation Engineering and Assistive Technology Society of North America.

2000

Ehrenkrantz, Ezra; Hutchings, Lynn, B.; & Olsen, Richard, V. (2000). ***A house for all children: Planning a supportive home environment for children with disabilities.***
NARIC Accession Number: R08473
ABSTRACT: Book provides practical guidelines for creating a safe and supportive home for children with physical disabilities and offers strategies for meeting the physical, social, and emotional needs of families adjusting to living with a disability. The information was gathered from interviews with 65 families who had modified their homes or built special homes to accommodate their children's disabilities.

1999

(1999). ***The Center for Universal Design: Final report, December 1999.***
NARIC Accession Number: O13321
ABSTRACT: Final report of the Rehabilitation Engineering Research Center (RERC) on Accessible and Universal Design in Housing. Describes the activities of the RERC on Universal Design in Housing related to research and development, education, and outreach. Appendices list sources of funding, publications, seminars and workshops, presentations, and exhibitions, 1994-1999.

Mace, R.L.; Pace, R.J.; Trachtman, L.H.; & Young, L.C. (1999). **The universal design home: Are we ready for it?** *Physical and Occupational Therapy in Geriatrics, 16*(3-4), 1-18. Also in Taira, E.D.; & Carlson, J.L., eds. ***Aging in place: Designing, adapting, and enhancing the home environment (1-18). Haworth Press.***
NARIC Accession Number: J39215
ABSTRACT: Article about ways to make homes more universally usable, and providing a rationale for a more universal approach to the design of our built environment, making it more accessible to persons with disabilities and to older adults. Describes features of the Next Generation Universal Home developed by Ron Mace at the Center for Universal Design, including entrances, the bathroom, the kitchen, and general features.

1998

Dodd, F. (1998). ***Selected bibliography on universal design: A selection of books on creating accessible environments.***
NARIC Accession Number: R07825
ABSTRACT: Annotated bibliography of publications on universal design and accessibility. The bibliography contains descriptions of 130 items on universal design principles, accessibility in general, accessible housing, and accessible public spaces. The focus is on books considered to be most appropriate for British Columbia public libraries, and, to aid in the acquisitions process, certain books are identified as part of a core collection. Also contains a glossary, a list of distributors, and subject, author, and title indexes.

Kose, S. (1998). **From barrier-free to universal design: An international perspective.** *Assistive Technology, 10*(1), 44-50.
NARIC Accession Number: J35305
ABSTRACT: Article discussing issues related to the introduction of universal design in different cultures, emphasizing the effects of differing cultural expectations. Also discusses new moves in Japan toward universal design of buildings and products, including recent legislation and new research projects.

Mace, R.L. (1998). ***Removing barriers to health care: A guide for health professionals.***
NARIC Accession Number: O13322
ABSTRACT: Booklet providing guidelines and recommendations to help health care professionals ensure equal use of their facilities and services by all patients. Presents designs for accessible parking spaces, health care facility entrances, lobby and reception areas, single-user patient toilet rooms, dressing rooms, and examination areas. Also discusses the creation of teams to help determine and meet accessibility requirements, and how to provide customer-based services that meet the needs of patients with particular types of disability (mobility, vision, hearing, speech, and cognitive disabilities).

Mace, R.L. (1998). **Universal design in housing.** *Assistive Technology, 10*(1), 21-28.
NARIC Accession Number: J35302
ABSTRACT: Article about universal design in housing. Explains the differences between universal design in housing and barrier-free, accessible, and industry standard housing. Also explains the concept of hierarchies of usability, and the relationship between assistive technology and universal design in housing (universal homes avoid use of special assistive technology and devices, and instead incorporate consumer products and design features that are easily usable and commonly available).

Peterson, W. (1998). **Public policy affecting universal design.** *Assistive Technology, 10*(1), 13-20.
NARIC Accession Number: J35301
ABSTRACT: Article examining the cumulative effects of federal legislation and non-legislative activities on breaking down the wall of inequality for persons with disabilities and promoting the concept of universal design and universal access. Discusses accessibility of the built environment and of electronic and information technologies. The discussion includes early initiatives, the effects of the social changes of the 1960s and 1970s, the Fair Housing Amendments Act of 1988, the Americans with Disabilities Act of 1990, and the role of the National Institute on Disability and Rehabilitation Research.

Reagan, J.; & Trachtman, L. (1998). **Designing for the 21st Century: An international conference on universal design of information, products, and environments.** *Proceedings, June 17-21, 1998,* Hofstra University, Hempstead, New York, USA.
NARIC Accession Number: O12672
ABSTRACT: Proceedings of an international conference on universal design held in Hempstead, NY during June 1998. Includes studies of the application of universal design in residential and corporate architecture, interior design, way-finding clues, city streets, public transportation, museums, retail space, acoustics, playgrounds, recreation facilities, and university campuses. Other topics include: disability studies and the theoretical underpinnings of universal design; universal design education; user driven product development; integrating the needs of people with chemical sensitivities into universal design; aesthetics and universal design; and expanding universal design to include people with visual impairments.

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Document from the Education Resource Information Center (ERIC) search at www.eric.ed.gov are listed below:

2005

Kennedy, Mike. (2005). **Novel approaches.** *American School & University, 77*(5), 16-18.
ERIC #: EJ773256
ABSTRACT: The school construction boom that began in the 1990s has given administrators and designers a chance to go beyond the traditional school layout of double-loaded corridors stacked on top of each other. Those building schools for the 21st century are recognizing that the schoolhouses they attended no longer may be suitable to meet the needs of today's students. Designers and educators have many opportunities to incorporate innovative strategies and systems that can enhance the learning environment for students and teachers. This article discusses 10 concepts schools and universities can explore to bring about more effective school facilities: (1) space; (2) design-build; (3) adaptive reuse; (4) universal design; (5) joint use; (6) Crime Prevention Through Environmental Design (CPTED); (7) outdoor learning; (8) flexible space; (9) phone systems; and (10) interactive whiteboards.

2004

(2004). **Universal design for learning (UDL): Reaching all, teaching all.** *Delaware State Department of Education.*
ERIC #: ED485470 – [ERIC Full-Text]
www.eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=ED485470.
ABSTRACT: Universal Design for Learning (UDL) emerged from the field of architectural design when federal legislation required universal access to buildings and other structures for individuals with disabilities. Architects began to design accessibility into buildings during their initial design stage rather than retrofitting standing structures. Using this architectural principle, UDL is a strategy to eliminate barriers that students may encounter to learning. Universal Design for Learning was a term coined by the Center for Accessing Special Technologies. UDL includes universally designed instruction as well as the concept of universally designed curriculum and universal design in assessment. Each of these concepts deals with the idea that education, in general, should be designed up front for access by all students, whether the curriculum, the instructional strategies, or the assessment. This document examines: (1) what UDL is and is not; (2) UDL & the link to the brain; (3) benefits of universal design; (4) UDL lessons learned; (5) implications for teachers; (6) implementation of UDL; and (7) UDL resources.

2003

Clarke, Pamela, H.; Haar, Sharon; Hendrickson, Jamie; Moelis, Cindy, S.; Nowaczewski, Jeanne, L.; & Robbins, Mark. (2003). ***Architecture for education: New school designs from the Chicago competition.***
ERIC #: ED479732 – [ERIC Full-Text]
www.eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=ED479732.
ABSTRACT: This volume documents the work that resulted from the Chicago Public Schools Design Competition, explaining research and policies underlying the competition's criteria. The volume has three parts. Book one, "The Chicago Experience," written by the competition's organizers, describes the competition's process and explains how it allowed community members, educational experts, and architects to collaborate in the design of schools that will foster the education of students, support quality teaching, and increase community involvement. It also chronicles the changing trends in public school architecture in Chicago. Book two, "New School Designs," offers plans and ideas for schools designed for the 21st century. The competition's two winning designs and those of the finalists are extensively documented in drawings and renderings. Book three, "Policies and Principles," explores policies that provided the impetus for the Chicago competition. It discusses the advantages of smaller learning environments; the benefits to students, teachers, and communities of universal design; application of sustainable design to the creation of public schools; and the importance of cost feasibility when building on a public budget. The section ends with a complete list of the winning, finalist, and notable architectural firms involved in the competition and a list of professional resources for creating new schools.

Gips, Kathy. (2003). **ADA design.** *School Planning & Management, 42*(3), 28-32.
ERIC #: EJ667993
ABSTRACT: Describes requirements for existing educational facilities under Title II of the Americans with Disabilities Act and addresses issues such as guidelines

for children, wheelchair-accessible and ambulatory stalls, areas without their own section in the standards, assistive listening devices in auditoriums, ramp slope, emergency evacuation planning, web sites and software, and universal design aspects of acoustics and ergonomics.

2002

(2002). **Marble Fairbanks Architects: Chicago Public School.** *Architecture, 91*(1), 68-71.
ERIC #: EJ641142
ABSTRACT: Looks at the design features of a 120,000 square foot Chicago elementary urban school that accommodates 900 students, 25 percent of whom are disabled. The school is based on a small school design that can maintain a feasible budget while providing universal access. The design also helps the school blend into the surrounding urban neighborhood. Photographs and floor plans are included.

2001

Erikson, Rolf; & Markuson, Carolyn. (2001). **Designing a school library media center for the future.** *American Library Association, Chicago, IL.*
ERIC #: ED449658
ABSTRACT: This booklet presents guidance on building superior school library media centers by outlining conceptual plans from actual school libraries and explaining how to address specific planning and operational issues. The booklet discusses how to address the unique ergonomic and technology needs of children; how to control costs using proven bidding and evaluation methods; how to understand the technical drawings and language used in architecture; and how to limit liability while creating universal, Americans with Disabilities Act compliant access. Appendices provide the common architectural symbols, suggested space allocations and adjacencies, a sample area data form, general information on shelving, chair and table heights, sample furniture specifications, and a list of furniture manufacturers.

Solis, Margarita. (2001). **Camping programs: Critical success factors in accessible programs.** *Taproot, 13*(1), 17-21.
ERIC #: EJ635810
ABSTRACT: Examines five critical factors in creating accessible camping programs for children with disabilities: (1) program mission expressing inclusivity and empowerment, (2) staff training that creates awareness and skills for inclusive programming, (3) fully accessible facilities, (4) shift in program design from "accessible program model" to "universal design," (5) and staff resources to provide specialized services.

2000

Weisman, Leslie, Kanes. (2000). ***Integrating public schools through universal design.***
ERIC #: ED466090 – [ERIC Full-Text]
www.eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=ED466090.
ABSTRACT: This paper explains what universal design is and is not and discusses slides of various products and environments that embody universal design principles. The paper explains that although the term "universal design" suggests a "one size fits all" approach to designing, quite the opposite is true. Rather, universal designers strive to create aesthetically beautiful and environmentally sensitive buildings, places, and products that are equally comfortable, accessible, and suitable for a wide spectrum of diverse people. Even though advocates of universal design recognize that it is nearly impossible to design all things for all people, the ultimate objective is to be as inclusive as possible. After making several points about universal design, the paper offers principles for universal design with related guidelines and discusses the example slides. The principles are: (1) Equitable use: The design is useful and marketable to people with diverse abilities; (2) Flexibility in use: The design accommodates a wide range of individual preferences and abilities; (3) 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; (4) Perceptible information; (5) Tolerance for error: The design minimizes hazards and the adverse consequences of accidental or unintended actions; (6) Low physical effort; and (7) 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.

1999

Bar, Laurel; & Galluzzo, Judith. (1999). ***The accessible school: Universal design for educational settings.***
ERIC #: ED434503
ABSTRACT: This book provides practical reasons for the Americans with Disabilities Act requirements for accessibility of school sites, buildings, and educational rooms as well as clear illustrations to aid in the expla-

nation of the guidelines. It addresses practical matters such as safety and cost-effectiveness while increasing sensitivity to different levels of physical ability, locomotion, sensory awareness, and intellectual ability. Specific topics involving ADA guidelines include: space allowances, reach ranges for wheelchair users, vehicle and pedestrian access, safety in outdoor play and learning environments, emergency systems, restrooms, and drinking fountains. Besides standard classrooms, room accessibility guidelines also cover art and music rooms, home economics rooms, science labs, greenhouses and gardens, assembly areas, gymnasiums, cafeterias, and libraries and media centers.

Rydeen, James, E. (1999). **Universal design.** *American School & University, 71*(9), 56,58,60,62.
ERIC #: EJ585878
ABSTRACT: Examines universal school design that is both user-friendly for all students and compliant with the Americans with Disabilities Act. This approach provides the basic functional design issues for easy traffic control, as well as orientation and classrooms that are adaptable to future curricular changes. Discusses new standards that impact design decisions for pre-high school facilities and highlights a model preschool center.

1998

Bourke, Andrew; Silver, Patricia; & Strehorn, K.C. (1998). **Universal instruction design in higher education: An approach for inclusion.** *Equity & Excellence in Education, 31*(2), 47-51.
ERIC #: EJ574638
ABSTRACT: Discusses the application of Universal Design, design of facilities to accommodate people with disabilities and others such as the elderly, children, and people with temporary disabilities, to higher education. Opinions of 13 faculty members about universal design provide helpful information for implementation.

Mace, Ronald, L.; Mueller, James, L.; & Story, Molly, Follette. (1998). ***The universal design file: Designing for people of all ages and abilities. Revised Edition.***
ERIC #: ED460554 – [ERIC Full-Text]
www.eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=ED460554.
ABSTRACT: This book presents a guide to the concept of universal design, the design of products and environments to be usable to the greatest extent possible by people of all ages and abilities/disabilities. Chapters 1 and 2 present a brief history of universal design and examine the spectrum of human abilities. Chapter 3 addresses the seven principles of universal design: (1) equitable use; (2) flexibility in use; (3) simple and intuitive use; (4) perceptible information; (5) tolerance for error; (6) low physical effort; and (7) size and space for approach and use. Chapter 4 offers case studies to illustrate each of the seven principles including: (1) promoting equality while preserving history at the University of Virginia; (2) consideration by the Fiskars company of various customer ages and abilities in design of tools such as scissors; (3) the IKEA company's commitment to simplicity in product assembly; (4) designing for the senses at the Lighthouse, Inc.; (5) McKechne Plastics' elimination of measuring tasks in its "squeezemeter" dispenser; (6) redesign of classic Tupperware by that company; and (7) Steelcase, Inc.'s commitment to a new approach to workplace design. A resource list is appended. (Contains approximately 300 references).

Salmen, John, P.S. (1998). ***Everyone's welcome: The Americans with Disabilities Act and museums.***
ERIC #: ED437754 – [ERIC Full-Text]
www.eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=ED437754.
ABSTRACT: This manual was designed to assist museums in becoming accessible to all individuals, including people with disabilities, in compliance with the Americans with Disabilities Act 1990 (ADA). Following an introduction that addresses museum attendance, accessibility, universal design, and different types of disabilities, chapter 1, "ADA Basics for Museums," explains the basics of the law and outlines the legal requirements of museums under the ADA. Chapter 2, "A Strategy for Accessibility," outlines a nine-step strategy of building blocks for achieving ADA compliance. The steps include: (1) accessibility statement; (2) accessibility coordinator, (3) accessibility advisory council; (4) staff training; (5) review of existing facilities and programs; (6) planning for accessibility; (7) promoting and advertising accessibility in the museum; (8) grievance procedures; and (9) ongoing review of access efforts. Chapter 3, "Accessible Facilities and Exhibits," gives a wide range of practical and specific recommendations on how museums can design accessible exhibits and programs. The final chapter, "Content Communication," presents alternative ways that museums can effectively communicate information about the content of their collections to all visitors. A 20-page resources section is provided that includes further sources of information about the ADA.

Documents from the National Library of Medicine PubMed search at www.pubmed.com are listed below:

2007

Prellwitz, M.; & Skär, L. (2007). **Usability of playgrounds for children with different abilities.** *Occupational Therapy International, 14*(3), 144-55.
PMID #: 17624873
ABSTRACT: The aim of the present study was to better understand how children with different abilities use playgrounds to engage in creative play and interact socially with their peers. Twenty children aged between 7 and 12 years, with different abilities, participated in interviews. The findings showed that playgrounds served as a reference point for all the children, they challenged a child's physical abilities and provided opportunities for role-playing and social interactions. However, for children with disabilities, playgrounds had limited accessibility, usability and did not support interaction with peers. A methodological limitation of the study was that the interviewer only met the children once. Further research should be carried out to investigate if creating playgrounds according to universal design principles and adapting them to the needs of children with disabilities would improve social interactions and provide more opportunities for play.

2006

Enderle, J. (2006). **Universal design in engineering's future.** *IEEE Engineering in Medicine & Biology Magazine, 25*(4), 4, 6.
PMID #: 16898651
No abstract available.

Kuo, N.W.; & Wang, C.H. (2006). **Zeitgeists and development trends in long-term care facility design.** *Journal of Nursing Research, 14*(2), 123-32.
PMID #: 16741862
ABSTRACT: Through literature analysis, in-depth interviews, and the application of theDelphi survey, this study explored long-term care resident priorities with regard to long-term care facility design in terms of both physical and psychological needs. This study further clarified changing trends in long-term care concepts; illustrated the impact that such changes are having on long-term care facility design; and summarized zeitgeists related to the architectural design of long-term care facilities. Results of our Delphi survey indicated the following top five priorities in long-term care facility design: (1) creating a home-like feeling; (2) adhering to universal design concepts; (3) providing well-defined private sleeping areas; (4) providing adequate social space; and (5) decentralizing residents' rooms into clusters. The three major zeitgeists related to long-term care facility design include: (1) modern long-term care facilities should abandon their traditional "hospital" image and gradually reposition facilities into homelike settings; (2) institution-based care for the elderly should be deinstitutionalized under the concept of aging-in-place; and (3) living clusters, rather than traditional hospital-like wards, should be designed into long-term care facilities.

Makay, N.S. (2006). **A universal concept.** *Rehab Management, 19*(9), 12, 14-5.
PMID #: 17131801
No abstract available.

2004

Bardwell, P.L.; & Saba, J.L. (2004). **Universal design concepts in the emergency department.** *Journal of Ambulatory Care Management, 27*(3), 224-36.
PMID #: 15287212
ABSTRACT: Universal patient bedrooms have been a design focus in healthcare settings for over a decade. The challenges among designers and healthcare organizations include the definition of universal, the application of the concept to more than simply patient bedrooms, and importantly, the long-term efficacy of the concept. This article addresses each of those challenges, first, by offering a range of definitions and then by testing the application of those definitions within an emergency department and offering case studies indicating initial successes.

Knecht, B. (2004). **Accessibility regulations and a universal design philosophy inspire the design process.** *Architectural Record, (1),* 145-50.
PMID #: 14735654
No abstract available.

2003

Iwarsson, S.; & Ståhl, A. (2003). **Accessibility, usability, and universal design: Positioning and definition of concepts describing person-environment relationships.** *Disability & Rehabilitation, 25*(2), 57-66.

PMID #: 12554380

ABSTRACT: PURPOSE: The aim of this paper is to position, define and discuss three concepts crucial for research and practice concerning person-environment relationships, viz. accessibility, usability, and universal design. METHODS: Literature review, synthesized with the authors' research and practice experiences. RESULTS: The authors suggest an instrumental, three-step definition to accessibility, highlighting that accessibility comprises a personal as well as a environmental component, and that accessibility must be analyzed by an integration of both. Suggesting the introduction of an activity component, accessibility should partly be replaced by the more complex term usability. Universal design is highlighted as a more process-oriented but less stigmatizing concept. CONCLUSION: This paper contributes to the positioning and definition of concepts describing person-environment relationships. The definitions suggested challenge current terminology, but can support in developing more efficient research and practice strategies. In order to develop theory for application to societal planning issues, the definition of concepts is a necessary step.

Quick Looks

More on UD: Universal Design Education Online

Udeducation.org is packed with resources to learn about or teach others about universal design. The well-designed site is written for users at any level, from K-12 to professionals. Resources include:

- Instructional Materials
- Content Resources
- White Papers
- Links
- An Annotated Bibliography

Udeducation.org was developed as part of the NIDRR Field Initiated Grant and is maintained by the Center for Universal Design at NCSU, the IDEA Center at the University of Buffalo, and the Global Universal Design Educator's Network.

Search Terms for Universal Design: An Architectural Perspective

- Accessibility/Legislation
- Accommodations
- ADA
- Architectural Accessibility
- Architecture
- Assistive Devices/Technology
- Attitudes toward Disabilities
- Barriers
- Bathrooms
- Building Design/Innovation
- Camping
- Community Living
- Compliance (Legal)
- Computer Applications
- Conferences/Proceedings
- Deinstitutionalization/Trends
- Design/Architectural/Educational/Guidelines Instructional/Requirements/Structural Elements
- Devices Design/Selection
- Disabilities
- Disability Studies
- Education/Pre-school, Elementary, Secondary, Post-Secondary, Professional, Universities, Urban
- Educational/Access/Environment/Facilities/Policy
- Emergency Service
- Engineering
- Equipment/Design/Standards/Trends
- Ergonomics
- Evaluation Methods
- Exhibits
- Facility Construction/Design/Guidelines/Planning Requirements
- Federal Agencies/Legislation/Regulation
- Funding
- Health Care/Facility Environment
- Home Modification
- Hospitals
- Housing
- Independent Living
- Individual Needs
- International Rehabilitation
- Leisure Activities
- Libraries
- Marketing
- Mobility Impairments/Limitations/Physical
- Model Cities
- Museums
- Needs Assessment
- Normalization
- Persons with Disabilities
- Policy/Public
- Program Design/Development/Evaluation
- Quality Of Life
- Recreation
- Regulation
- Rehabilitation Engineering Centers
- Research and Training Centers
- Research/Utilization
- Robotics
- Rural Services
- Safety
- School Buildings/Construction/Inclusion/Libraries Public
- Safety
- Social Environment
- Technology Transfer
- Training Materials
- Transportation
- Travel
- Universal Design
- Wheelchairs
- Work Stations

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