UNIVERSAL DESIGN FACILITY: STATE OF THE ART TEACHING TOOL

Betty Jo White and Patty Annis

Abstract

The purposes, features, funding, and evaluation of Kansas State University's new Universal Design Research and Demonstration Facility are described. The laboratory permits: 1) hands-on integration of the universal design concept into both resident- and off-campus instruction; and 2) applied research on user-based environmental design innovations. Five state-of-the-art prototype, testing, and demonstration areas include the office/work environment, kitchens, bathroom/restroom modules, lecture/focus group area, and an open product testing space. Classroom and workshop demonstrations and distance learning activities teach students, practitioners, and cooperative extension service clientele across the state. Most research completed to date is based on Rogers' work on diffusion of innovations. The facility's Advisory Board and attendant test population represent people of all ages and capabilities. To equip and install the facility, faculty used university funds and obtained furnishings, fixtures, and equipment on consignment, at discounted prices, or as contributions from producers. Short and long-term evaluations of the facility's effectiveness are continuous.

Introduction

The Kansas State University Interior Design Program is playing an active role in the adoption-diffusion process for the Universal Design concept. The curriculum has been augmented by a new Universal/Lifespan Design Research and Demonstration Facility (UDF) recently developed in the College of Human Ecology building. The retrofitted former household equipment laboratory enables faculty to better prepare students and practicing designers to become change agents who routinely create environments that are usable by everyone. To facilitate replication at other institutions, this paper describes the UDF's rationale, plan, teaching and research activities, funding, and evaluation.

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Building on the Interior Design program's recognized strength in user-based design, the UDF focuses on accommodating changing environmental needs without extensive renovation, an institutional look, or resale value complications. The laboratory's purposes are: 1) to provide an instructional environment, with examples of practical applications, for students and professionals who design, build, manage, and regulate the physical settings in which people live and work; 2) to expand the knowledge base through applied research on environmental design innovations that support user needs over a wide range of capabilities; and 3) to promote the adaptation of Universal Design principles through outreach activities using the facilities as a model for consumers and building industry personnel.

The UDF not only further integrates the universal design concept within the Interior Design curriculum, but also introduces the concept to students across campus. A key element of the UDF program is the involvement of users with disabilities or age-related impairments in its development, teaching, and evaluation activities. The Universal Design Advisory Board includes a diverse group of individuals who serve as user experts representing people of all ages and capabilities.

Universal Design Rationale

All people experience, at least temporarily, special needs related to the near environment. Also, longer-term needs are growing in both number and proportion as a result of the aging U. S. population, changes in household composition, and mainstreaming of people with disabilities. Universal/lifespan design addresses those needs—with accessibility, adaptability, affordability, and aesthetic value.

The long-term objective of universal or lifespan design is to create homes and workplaces that accommodate children, individuals with disabilities, and older people. Instead of institutional-looking structures that are marketed as "accessible," designers will develop universal buildings and products usable by all people.

Federal law mandates that much of today's new construction be barrier-free (the most notable exception is private single-family housing). The 1988 Fair Housing Amendments Act requires new residential structures with four units or more to be minimally wheelchair accessible and to include specified adaptability features. The Americans with Disabilities Act (1990) extends similar requirements to the workplace and public accommodations. Until new universally-designed structures become the norm, however, many homes, businesses, and public places must be retrofitted to allow all people to live, work, and age in place in their home communities.

The Universal Design Facility provides a lifespan-oriented resource not available at other major research universities in the region. Most programs in higher education have focused only on older adults, vocational rehabilitation, one-on-one training for independent living, or on a particular type of disability. This facility encompasses a broader scope, approaching universal design features and products from a holistic, interdisciplinary viewpoint.

The UDF faculty includes experts in interior design, housing, human needs, marketing, and policy analysis. They work with, but do not duplicate the activities of,

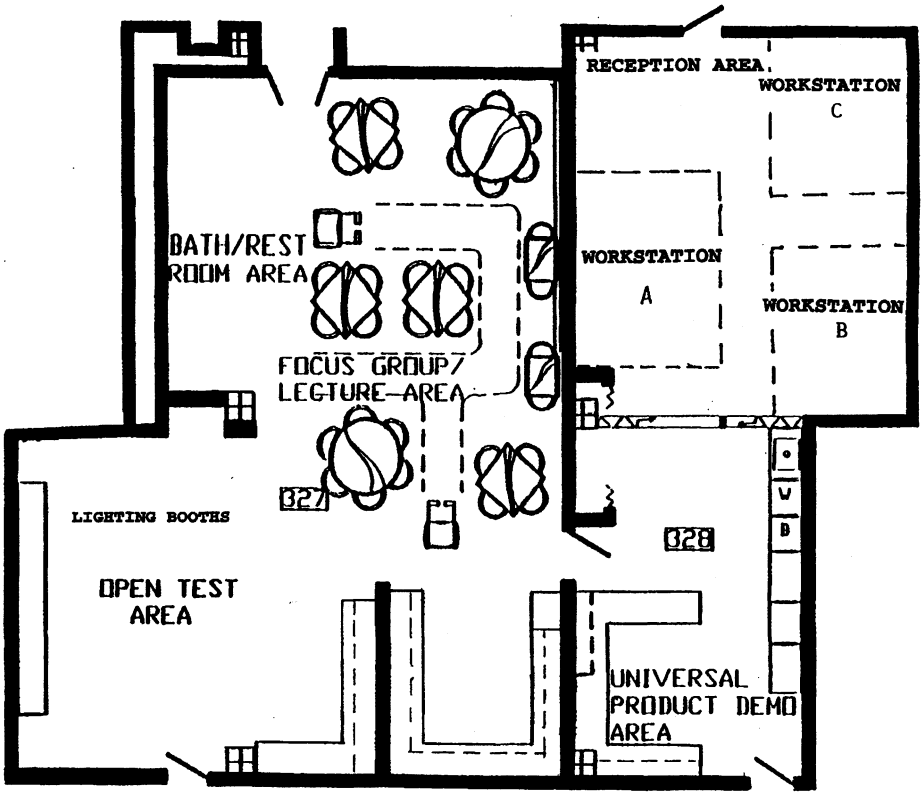

Figure 1. Universal Design Facility Floorplan.

other practitioners such as physical and occupational therapists, gerontologists, architects, and human factors engineers. The UDF faculty draw upon extensive experience with both disability- and age-related design concerns and in working with diverse groups of users. Furthermore, each member brings a specific type of housing or environmental design expertise and practical experience to the program.

The Facility Plan

Five state-of-the-art prototype, testing, and demonstration areas make up the UDF (Figure 1): 1) office/work environment area; 2) kitchens; 3) bathroom/restroom; 4) lecture/focus group; and 5) open product testing area.

The **Office/Work Environment Area** includes height-adjustable computer work stations with ergonomically-designed seating. Under the supervision of the manufacturer's representative (who arranged for contribution of the product), design students installed commercial carpet tile flooring. Additional features planned for the office/work area include glare-free, indirect lighting; telecommunications system display units; and "smart" office feature displays.

The universal **Kitchen** plans (Figures 2-6) were designed to showcase features now on the market and to meet the following objectives:

- Demonstrate human-factored universal design that is accessible, adjustable, adaptable, affordable, and attractive;
- Be usable by all people, regardless of age or ability;
- Meet the U. S. Department of Housing and Urban Development's design guidelines for adaptable kitchens (in compliance with the Fair Housing Amendments Act [1988]).
- Integrate various major appliance and cabinetry components in unified, non-custom, and non-institutional-appearing residential kitchens that permit updating as new products are developed.

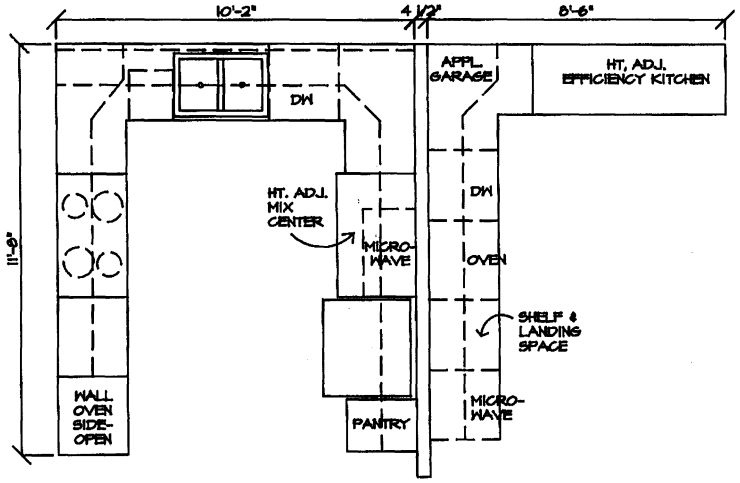

Figure 2. Universal Design Kitchens: Floor Plan

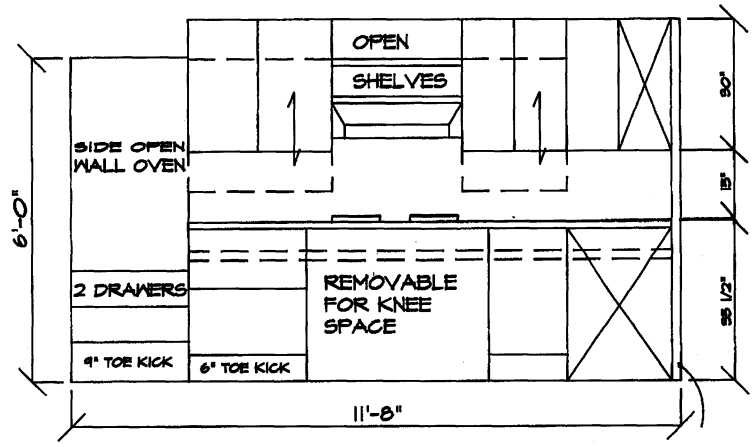

Figure 3. U-Shaped Kitchen East Wall

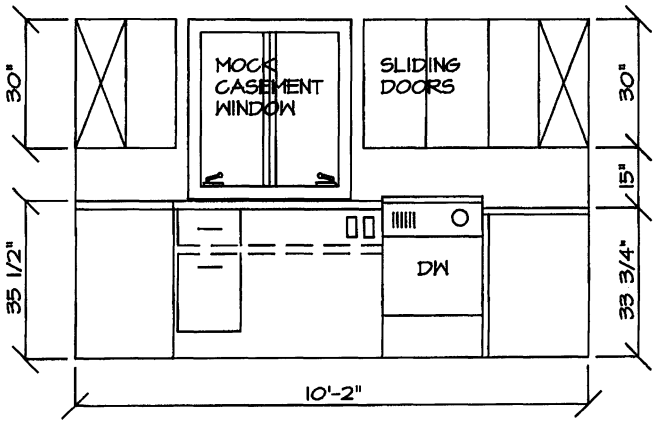

Figure 4. U-Shaped Kitchen South Wall

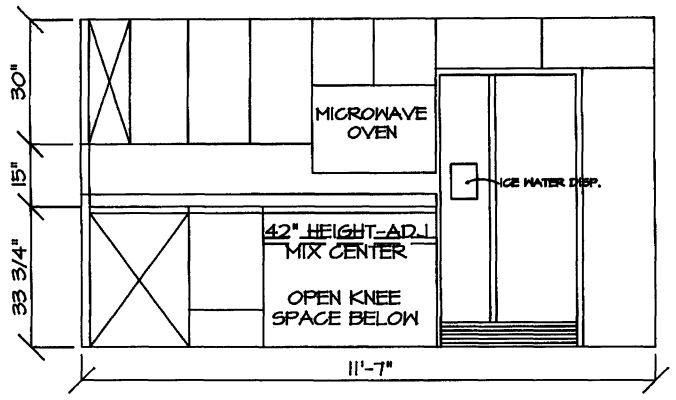

Figure 5. U-Shaped Kitchen West Wall

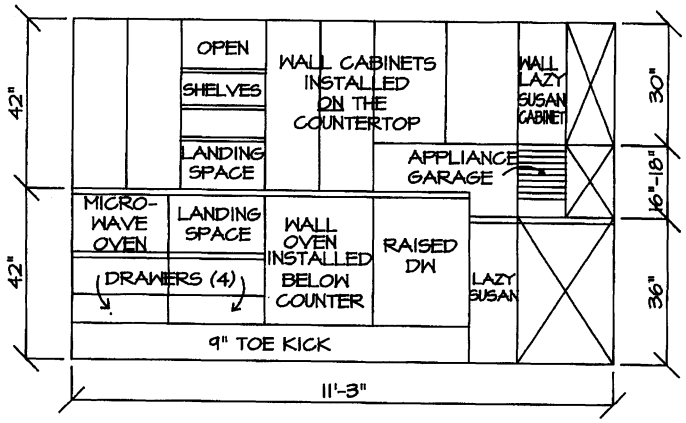

Figure 6. No Stoop-No Bend Wall

Specific components of the accessible/adaptable kitchen area include height-adjustable wall cabinets, sink, and range centers; accessible stock kitchen cabinets; side-by-side refrigerator/freezer with in-door ice/water dispenser; induction cooktop; side-hinged wall oven; varied microwave oven placements; and shallow-bowl sink with spray hose, single-lever high-rise faucet, recessed/flexible drain, and insulated water supply lines. A height-adjustable efficiency kitchen unit is also included.

The **Bathroom/Public Restroom Area** consists of movable wall components (with attached fixtures) that can be re-arranged by students to experience and evaluate wheelchair maneuverability in residential bathrooms and public restrooms. The modules will include barrier-free, side-entry or sit-down bathtub; toilets with and without risers and grab bars; transfer and roll-in shower facilities; height-adjustable lavatory/vanity sink; reinforced framing for installation of assist features; front-loading washer/dryer with low-vision, easy-grip controls; and a toilet stall that complies with the ADA Accessibility Guidelines (U. S. Department of Justice, 1991).

The **Lecture/Focus Group Area** will demonstrate ADAAG-compliant restaurant seating with both round and square tables and chairs in multiple arrangements. In conjunction with the College's Communication Sciences and Disorders program, an assistive listening system for the hearing-impaired may also be installed in the lecture area. The nearby open **Universal Product Testing Area** will be equipped for space planning exercises and research activities such as consumer use and evaluation of prototypes and existing products.

Teaching and Research Activities

UDF faculty use the facility and its attendant test population to:

- Demonstrate universal design applications via classroom instruction, workshops, and video teleconferences;
- Conduct interdisciplinary design and development activities using universal design features and assistive devices; and
- Perform related market research and public policy analyses.

Using experiential learning methodologies, students will apply lifespan design principles to residential, commercial, and public use problems that incorporate space planning, systems furnishings, fixtures, equipment, universally-designed products, and assistive technologies. The UDF's instructional objectives state that each student will:

- Develop a personal and professional commitment to implementing universally designed living and working environments;
- Promote the universal design concept and its implications for user-based design; and
- Utilize a holistic approach to designing for users of all ages and abilities.

Currently, faculty are developing new individual and group learning activities that utilize the UDF in courses across the Interior Design curriculum. These problem-solving activities, which also may be adapted for use without specialized demonstration facilities, include:

- A student-produced video filmed from the (lower) viewpoint of young children as they negotiate a man-made environment designed primarily for adults and automobiles.
- CAD-based design of adaptable work stations using symbols libraries provided by office systems furniture manufacturers.
- New and retrofitted kitchen designs to accommodate typical age-related deficits (arthritis, heart condition, and visual impairment) with standard cabinetry and equipment.
- "Universal Design in Action" continuing education workshops on design requirements of the 1988 Fair Housing Amendments Act and the 1990 Americans with Disabilities Act.

The resultant products will include floppy disks with kitchen and work station planning exercises, computerized ADAAG regulations (utilizing the Building Owners and Managers Association International [1991] or similar accessibility audit checklists), and workshop materials. An ultimate goal is to offer the educational materials not only to students, workshop attendees, and cooperative extension service audiences, but also to educators, designers, builders, and universal product manufacturers.

Although the UDF will facilitate new experimental studies and product evaluations, faculty have already begun the research program, much of which has been based upon Rogers' work in diffusion of innovations (1995). Projects have addressed a variety of related issues, including residential modifications made by older homeowners (White, 1992). Recent graduate student theses have investigated: 1) mature homeowners' perceptions of universal design features (Mannion, 1992); 2) kitchen designers' efforts to enable aging in place (Guetzko & White, 1991); and 3) home builders' and remodelers' roles in implementing universally-designed single-family housing (Blanco, 1994).

A local test population including persons of all ages and abilities will be developed for use in research contracts and grants that involve consumer product evaluation. For example, children and parents from the College's Early Childhood Education Laboratory and Child Care Center (both of which are involved in mainstreaming children with disabilities) will be invited to join the test population.

Interdisciplinary, Continuing Education, and Outreach Activities

In addition to 175 Interior Design students, the UDF introduces the Universal Design concept to students majoring in Apparel Marketing, Architecture, Education, Gerontology, Hotel/Restaurant Management, and Lifespan Development. Cross-campus collaborations involve faculty and students in the University's College of Architecture, Planning and Design, Center for Aging, and Human Factors laboratory.

UDF outreach workshops, multi-mediated instruction, and off-campus teleconferencing will utilize the University's Cooperative Extension Service, Division of Continuing Education, and Educational Communications Center. The target audiences for workshops and distance learning include designers, builders, real estate personnel, facility and property managers, retailers, hospitality industry personnel, government offi-

cials, cooperative extension field staff, gerontologists, and consumers, their families, and advocates.

Another important opportunity for outreach and public awareness is the annual university-wide Open House that attracts high school students, parents, and alumni from across the state. On that day, tours and demonstrations of the UDF and displays of student projects also educate large numbers of potential beneficiaries of lifespan design.

Facility Funding Resources

The university could provide only limited funds for renovation and purchase of equipment for the UDF. Thus, after extensive market research to identify leading producers of ability-sensitive design, the faculty began to solicit industry support for furnishings, fixtures, and equipment on consignment or as tax-deductible contributions. In addition to an on-site plaque listing all cooperating firms, the promised "payoffs" for their products' use in workshops and video teleconferences include regional and national visibility, marketing returns, and receipt of results and recommendations from the UDF's applied research projects.

After five years, efforts to furnish and equip the UDF with contributions had achieved modest success. In 1994, however, the department provided $8,000 seed money that the faculty combined with a $1,500 gift to purchase nearly $100,000 worth of products at discounted prices. The University then allocated an additional $6,000 for renovation and installation costs.

Potential funding sources for future development and operation of the UDF include foundations associated with the building industry, aging-focused groups, and furnishings/equipment manufacturers. Workshop and conference fees also will generate revenue to support UDF administrative and operating costs.

Program Evaluation

The faculty will utilize a variety of procedures to assure and evaluate the facility's effectiveness in teaching, researching, and implementing the universal design concept. Students' designs will be completed and critiqued with the help of persons with specific lifespan characteristics or functional impairments, practicing designers, and interdisciplinary groups of faculty members. Critiques will rate the designs not only on function, but on aesthetics and non-institutional, non-specialized appearance and affordability. UDF Advisory Board members will also participate in evaluating the facility and its research projects.

The long-term evaluation goal and ultimate test of the UDF's success would be to: 1) solicit evaluations by practitioners who utilize the facility; and 2) analyze designs and activities of selected alumni in five years' time. In the meantime, faculty will continue to require students' projects to include universal design elements. Through their portfolios, these students will help educate and receive valuable feedback from the design practitioners they seek to join.

Conclusion

The Universal Design Facility "stage" is set at Kansas State University. The Work Environment and Kitchen areas are complete. The bathroom components and remaining areas are now under development. The actors are in place: students began to learn by helping to design and install various components within the facility, as well as by performing related research. Practicing designers and housing industry personnel were invited to the facility's first Universal Design workshops during 1995-96. Finally, after more than six years of anticipation, the faculty are eagerly stepping into leading roles in the diffusion of the Universal Design concept.

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