UNIVERSAL DESIGN EDUCATION AT THE COLLEGE OF DESIGN, NC STATE UNIVERSITY
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Introduction
The Center for Universal Design has a twelve-year involvement with the College of Design to promote Universal Design in undergraduate and graduate design education. The following goals, objectives, and strategies guide our work today and for the future.

Goal
The goal of the Center’s work with the College is to integrate universal design into the College of Design curriculum for all disciplines throughout undergraduate and graduate programs.

Objectives
The strategies we employ enable students to gain an awareness of the issues of all people as part of a continuum of life experiences including those who are temporarily able bodied, those with permanent and temporary disabilities, and people who are older. Students will understand that there are design implications when meeting the needs of people with different abilities. Students will understand the natural range of human performance that can include variances in sight, hearing, movement, and thought processes. Students will also understand the importance of considering a range of ages in design problems.

Students will demonstrate their knowledge of the continuum of design solutions from design for an individual to universal design. This process will include the understanding and application of universal design principles. By the conclusion of their education students will be able to use universal design resources including the Center for Universal Design.

The following strategies include ongoing activities organized and conducted by Center staff as well as those that are being developed. They represent scheduled activities, e.g., freshman seminars, simulations, workshops, courses, and ongoing opportunities such as studio reviews and Graduate Research Assistantships.
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Fig. 1 This graphic displays the increasing universal design opportunities that are available to students as they progress through undergraduate and graduate programs. Richard Duncan/David Ringholz

Description: This text graphic has five columns each headed by a year designation: Fresh, Soph, Junior, Senior, and Grad, from left to right. Below these headings are the names of some of the opportunities available to a student in each year. Each higher year has all the opportunities of the prior year plus additional items. Beginning with Seminars and Studio available to freshmen and ending with Graduate that adds Sight Sound and Motion, Introduction to Human Centered Design, Lectures, Independent Study, Student Work, Advanced Human Centered Design, and Graduate Research Assistant.

Strategies

The initiative includes opportunities over the years of a student’s undergraduate and graduate education, offers a multi-modal spread of opportunities from lectures to hands-on activities, and follows a pedagogical sequence offering increasingly sophisticated opportunities in later years.

Freshmen seminars at CUD (Seminars)
First year design students are exposed to design for universal usability at many scales. All first year students at the College of Design participate in one of seven three-hour seminars that include exercises which demonstrate the range of ability levels that exist in the student body, faculty and staff at the College, emphasizing such typical changes and effects such as aging, injury, and circumstantial disability that can alter each of our ability levels over time. They are also introduced to Center staff and facilities.
Fig. 2 Hands-on experiences provide direct learning about the benefits of universal design.
Dick Duncan

Description: Image shows four students, two of whom are carrying boxes that must be maneuvered through accessible and less accessible doors without using their hands. This demonstrates the circumstances that can change our typical abilities and show how universal and accessible features such as lever handles and automatic opening doors benefit everyone at one time or another.
Fig. 3 Students evaluating the function of kitchen utensils
Dick Duncan

Description: This image shows a student peeling a carrot with one of several different types of vegetable peelers. Students use and evaluate several similar utensils comparing universal and other product features.

Sophomore simulation activity: Sight, Sound, and Motion  (SSM)
Design students are sensitized to conditions that limit function and subsequent interaction with the environment through a half-day workshop simulating a variety of disabilities.

Fig 4 Students practice using a walker on stairs to understand the challenges a typical environment can pose.
Jackie Gottlieb

Description: Three students are descending a set of exterior stairs. One of the students is using a four-legged walker. The walker’s back legs are perched on one stair while the front legs extend over the next stair. The student is learning about the imbalance this situation produces that requires extra strength and attention to successfully negotiate.

Approximately 40 sophomores and graduate students participate each year. The Center for Universal Design recently took over the production of these annual events that have a 25-year history at the College. These include mobility, hearing and vision awareness exercises through the College campus and interactions with people with disabilities. Students identify common features that are accessible and universal.

**Lectures by staff**
(Lectures)
Center staff are regularly invited to give presentations about CUD, Principles of Universal Design and other universal design issues to students from the College of
Fig. 5 CUD staff lead a discussion of universal architectural features
Jackie Gottlieb

Description: Image shows two male staff members conferring at the front of a lecture hall. On the whiteboard behind them are notations from the class’s discussion of universal and accessible features on campus.

Design and other academic institutions. Classes in the Departments of Architecture, Landscape Architecture, and Industrial Design have benefited from these lectures. These include periodic informal discussions (e.g., Brown Bag lunches) which are also open to the university community.

Studio review and critiques by staff and members of the community
(Studio)
Regular design critiques are scheduled throughout the semester in the in ARC, LAR and ID sophomore, junior, and senior design studios to evaluate student projects. CUD staff, bringing a user-centered approach to concept development and refinement, frequently attends these critiques. Members of the local disability community also attend critiques.
Courses taught by CUD staff (IHCD, AHCD)

Junior and senior industrial design students are required to take at least one of the two human-centered design courses (Introduction to Human Centered Design-IHCD) taught by CUD staff. Students from other design disciplines take these courses as electives. In these classes, students receive more detailed information about how functional limitation impacts environmental interaction and the implications for design of these environments. Students outside the College (e.g., industrial engineering, psychology, and mechanical engineering) also participate in these courses as electives.

Staff have also taught advanced design studios (Advanced Human Centered Design – AHCD) that require students to demonstrate understanding of human-environment interaction and apply appropriate universal design principles. These include development of kitchen cabinets, shower/bath mix valves, can opener, etc.

Fig. 6 Industrial design student explains her design prototypes for showerheads and hand held showers.
Description: Student is standing next to a black 36”x42” display board. On the board are mounted a model shower head and hand held shower with a sliding control valve. She is explaining the usability of her features to the rest of the class.

Spring 2000 witnessed the offering of the world’s first on-line introductory course in universal design. This course gives students a basic understanding of the concepts and principles of universal design and the benefits of the approach for people with disabilities and for all individuals. An intermediate course is planned for the future.

Fig. 7 The online course in universal design features web posted images from students.

Molly Story

Description: Image shows a web page of photographs posted by students taking the Center’s online class in universal design. Students take photos of environments that have features exemplifying particular universal design principles and post them for discussion. One photo on this page is of a typical urban street corner with people crossing and cars both moving and parked in view. The other photo is of a wooden play structure for small children with a colored plastic tunnel and slide. The play structure appears to be installed on a blue carpet or mat.
Other Universal Courses

In 2001, the Center and the College launched an innovative universal design studio course, designated “Arch 400-004 Design Studio,” in late August. The studio is offered to junior and senior architecture students who explore universal design in residential and nonresidential environments. The Center hosted the students in a specially designated portion of the Center’s offices. Center staff provided consulting to students and participated in design critiques.

Fig. 8 Design students learn by working with community residents
Marcelo Guimares

Description: Photograph shows a design student assisting an area resident who is visually impaired explore a large scale model of the College of Design campus. The student is explaining the building names and functions while guiding the hand of the resident.

Independent study at CUD

Students with individual interest in universal design projects can work with faculty and CUD staff to pursue educational, research and personal goals. Students may also choose from a large stock of project ideas generated at CUD through community-centered input streams including town hall meetings at local and national conferences and product evaluation sessions. Design projects include, pill bottle packaging, walker-wheelchair, adjustable height toilet, and faucet design.
Fig. 9 Independent study opportunities
Kelly Houk

Description: An industrial design student explains the universal features of a white model of an adjustable height toilet. The student is standing behind the full sized appearance prototype toilet that he developed under the joint direction of faculty and Center staff. The tank model toilet appears typical except for a central, vertical wide column that runs up the center of the tank. This is the water operated, hydraulic piston that raises and lowers the seat.

Graduate Research Assistantships (GRA)
Eligible students can qualify to work with CUD as Graduate Research Assistants.

Students work on Center activities such as publication illustrations, product development, product evaluations (assisting with focus groups on fire extinguishers, door handles), and research (ramp slope study).

Fig. 10 Students help evaluate an individual’s performance on a ramp.
Molly Story

Description: This photograph shows three students evaluating the use of a specially built research ramp. The ramp ascends moving away from the viewer. Walking up the ramp is an elderly test subject followed by a student. A student is on either side of the ramp observing. The ramp is set up in a large room with a darkly carpeted floor.

Work opportunities (Student Work)
There are also regular opportunities to work as paid staff on various project based activities.

Students are employed to work on projects such as client contact, design, and report generation for the home modifications clinic, modeling and CAD work on the universal children’s museum exhibit, drawing and modeling for Habitat for Humanity, drawing and CAD modeling for the ADA videos, and work on a CD illustrating universal design exemplars.

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Fig. 11 Working under the supervision of Center staff, students created illustrations of a talking thermostat will aid persons with vision impairments.
David Ringholz

Description: This illustration of a wall mounted thermostat shows a hand touching the “C” button on the device while a small audio speaker indicates a voice saying “Cool On”. The thermostat has an analogue dial on its left side with a large digital read-out next to it. It has large “warmer” and “colder” buttons and large simple controls on the right side to turn on the heat or cooling functions as well as to turn on the fan.

**Research opportunities**
Doctoral candidates with interest in UD may use the unique facilities and resources at CUD to support research and broaden the scope of this growing field.

Two doctoral candidates are currently supporting the Center’s mission. One student taught the new UD studio (above) and will assist with research later. Another student is currently assisting with research on environmental evaluation studies.

**Course concentration in universal design**
This is scheduled for future development, possibly including courses from other colleges and universities and using distance learning strategies and technology.

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