

The role of occupational therapists in universal design research

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Universal design, sometimes referred to as inclusive design, has historically been defined as 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” (Mace, 2014, para. 2). This definition led to the development of a conceptual framework summarized in the form of seven principles of universal design that were published in 1997:

The principles of universal design (Center for Universal Design, 1997)

1. Equitable use
2. Flexibility in use
3. Simple and intuitive use
4. Perceptible information
5. Tolerance for error
6. Low physical effort
7. Size and space for approach and use

While the principles are useful as an introduction to the topic, they have been criticized for their abstraction and the lack of a concrete strategy for operationalizing them in the context of real-world product design teams. Greater emphasis was also needed on social integration goals that would appeal beyond the design community to diverse professionals and to the public. Internationally, universal design is considered “design for human diversity, social inclusion, and equality” (Design for All Europe, 2008, para. 1). With an increased focus on health and wellness, active living, and sustainability initiatives across professional fields, universal design must be able to evolve with a changing population’s needs. Thus, Steinfeld and

Maisel (2012) proposed an adapted definition of universal design: “A process that enables and empowers a diverse population by improving human performance, health and wellness, and social participation” (p. 29).

In short, universal design involves making things easier, healthier, and friendlier to use (Steinfeld and Maisel, 2012). To exemplify the expanded scope of this new definition, the eight Goals of Universal Design were developed. Examples and detailed explanations of these goals can be found in the book *Universal Design: Creating Inclusive Environments*.

The Goals of Universal Design (Steinfeld & Maisel, 2012)

1. Body fit: Accommodating a wide range of body sizes and abilities
2. Comfort: Keeping demands within desirable limits of body function
3. Awareness: Ensuring that critical information for use is easily perceived
4. Understanding: Making methods of operation and use intuitive, clear, and unambiguous
5. Wellness: Contributing to health promotion, avoidance of disease, and prevention of injury
6. Social integration: Treating all groups with dignity and respect
7. Personalization: Incorporating opportunities for choice and the expression of individual preferences
8. Cultural appropriateness: Respecting and reinforcing cultural values and the social and environmental context of any design project (p. 90)

The fields of occupational therapy and universal design share much common ground. Both fields are fundamentally oriented to optimizing person-environment interactions. As occupational therapists, we typically focus on maximizing the functional performance of individual clients in the context of one or more everyday environments. In contrast, designers consider the person-environment interaction more abstractly, often having limited contact with the end user while striving to create products and environments that are as usable as possible for the greatest breadth of people. The two fields intersect with their shared goal of maximizing human performance by minimizing unnecessary environmental complexity — that is, reducing the physical, sensory and cognitive demands of the physical and social environment. Occupational therapists have a skill set that naturally lends itself to making collaborative contributions in the field of universal design.

This collaboration is exemplified at the Center for Inclusive

Design and Environmental Access (IDEA Center) at the University at Buffalo in the United States. The IDEA Center is an interdisciplinary collective that includes faculty, staff and students from three schools: Architecture and Planning, Engineering and Applied Sciences, and Public Health and Health Professions. The core group of eight faculty and staff includes representatives of five different disciplines: architecture, human factors engineering, urban planning, digital media and occupational therapy. The Center’s activities include a variety of projects: two federally funded research centres (one addressing universal design in the built environment, and the other targeting accessible public transportation), home modifications services, evaluations of public accommodations in accordance with the Americans with Disabilities Act, and product usability assessments for private sector companies in banking and transportation.

Although occupational therapy plays a substantial role in virtually

all IDEA Center activities, this article will focus on the contributions of occupational therapy to universal design-related research projects. Table 1 summarizes the unique occupational therapy contributions to the various key stages of typical human subjects-based research studies involving person-environment interactions.

Table 1. Occupational Therapy Contributions to the IDEA Center's Research Process

Research phase	Examples of occupational therapy contribution
Knowledge base	Understanding body structures and functions, health conditions, disease processes and disabilities Person-environment interactions affecting the individual and their activities Insights on service delivery systems and reimbursement structures that impact people with disabilities
Sampling	Forming sensible inclusion and exclusion criteria for the population being studied based on the research questions
Participant recruitment	Identifying community-based agencies through which participants can be recruited
Data collection tools	Identifying demographic categories that have relevance to data interpretation Identifying measurement tools that are appropriate for the population and research questions being studied.
Protocol development	Anticipating functional limitations of participants that may be taxed by the data collection procedure
Pilot testing	Simulating disability as a "participant" in order to refine the data collection protocol
Data analysis	Identifying meaningful statistical comparisons that will yield the most functionally significant and relevant findings
Data interpretation	Contextualizing the clinical relevance of the results based on the population and intervention being studied
Limitations	Identifying the practical constraints of a study's research design that are threats to its real-world applicability
Discussion	Contextualizing a study's findings in broader contexts and identifying areas that need future research

Occupational therapy contributions to the universal design research process

Occupational therapists have a core knowledge base that spans a variety of body structures and functions, health conditions and disabilities. An occupational therapist's understanding of person-environment interactions can help designers fully incorporate universal design strategies in their work. From their training and practice experiences, occupational therapists understand functional implications of disability, rehabilitation strategies, service delivery systems and social policies that might impact participants with disabilities in a research context.

Occupational therapists can assert their influence throughout the cycle of a universal design research project. At the outset, occupational therapists can identify meaningful inclusion and exclusion criteria for participant recruitment. Using their task analysis skills, they can identify the physical, cognitive, sensory and perceptual demands that a research protocol will place on participants and then translate those activity demands into meaningful screening criteria. Likewise, occupational therapists can identify salient demographic characteristics (e.g., age, gender, number of years post-rehabilitation, familial environment, use of assistive technology) that are potential grouping variables for statistical analyses and interpretation of results. They are a valuable resource for identifying community-based agencies (e.g., vocational rehabilitation, independent living centres, centres for blindness, developmental disability service organizations, adaptive recreation groups) through which to recruit participants.

Occupational therapists can also employ their knowledge base to enhance a research team's implementation of the research protocol. Occupational therapists know appropriate terminology and etiquette associated with various health conditions and disabilities, which can sensitize other research team members from different disciplines and help to create a more welcoming and comfortable research environment for participants. For example, an occupational therapist at the Center recently organized a staff training to familiarize team members with functional implications of vision impairment that might affect execution of the data protocol for participants who have vision loss. Trainings such as these often result in environmental modifications, identification of verbal cues, and other valuable adaptations to a data collection protocol.

Throughout data collection, occupational therapists anticipate

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how various functional limitations (e.g., strength, endurance, cognition) might influence participant performance during a protocol, grading tasks as needed to accommodate unique participant needs. For example, occupational therapists may anticipate the need for transportation accommodations for participants traveling to and from the study site, accommodations necessary in the lab environment for protocol administration, the need for rest breaks for participants and implications for participants who use mobility or communication devices.

Occupational therapists can affect the selection of appropriate data collection instruments and outcome measures that match the physical, cognitive and sensory capabilities of the populations participating in the study. They provide insight about the respondent burden of particular measures to help the research team select measures with appropriate physical and mental load. After data collection and analysis, an occupational therapist can broaden the scope of data interpretation to include the larger contexts of participation, inclusion and health and wellness literature. In summary, the presence of an occupational therapist on an interdisciplinary research team can influence and strengthen the entirety of a study's research methodology.

The IDEA Center has conducted usability trials for consumer products in the home, a new automated teller machine (ATM) design and a new shuttle bus access ramp design. In each of these studies, occupational therapists played a substantial role in all project phases, as described above. In addition, occupational therapists were crucial in the analysis phases of the studies to help recognize and functionally integrate the variety of recommendations for product design improvement with the design professionals on the research team.

How can you get involved?

The contributions occupational therapists make to universal design research projects can be generalized to other contexts. Opportunities exist within many universities to create interdisciplinary teams that foster inclusive research methods and design. Occupational therapists can promote themselves as valuable collaborators to researchers in human factors engineering, architecture and design programs. Occupational therapists who are already practicing in the universal design field can educate the larger occupational therapy community about additional ways occupational therapists can contribute to research teams engaged in person-environment evaluations. Occupational therapists may independently initiate universal design-related research in settings where none currently exists. These opportunities begin for students during their occupational therapy educational programs and continue throughout their careers.

Students

Occupational therapy students may take interdisciplinary electives with students from related disciplines (e.g., architecture, engineering, urban planning), benefiting from the diverse perspectives offered by students in other programs while enriching the perspectives on people with disabilities among those same peers. Similarly, occupational therapy students can seek collaborative opportunities with students in design or engineering programs that encourage projects involving people with disabilities. Capstone apprenticeship opportunities, required in American doctoral programs, may also

be created for occupational therapy students wishing to gain experience with universal design applications and research methods within existing centres and professional teams.

Faculty

Occupational therapy faculty can promote an interdisciplinary perspective on inclusive design in their courses by inviting guest lecturers with backgrounds in architecture, urban planning, engineering and industrial design. Likewise, occupational therapy faculty can offer to provide guest lectures for faculty in other departments. Occupational therapy faculty with a universal design background can also be a resource for occupational therapy practitioners and disability advocates in their local communities.

Practitioners

Community-based occupational therapy practitioners can promote universal design by participating in university-based research projects, providing insight on current clinical practices that may impact a particular research study. Practicing occupational therapists in medical, educational or other settings may also identify areas of need as research and development opportunities for university-based students and faculty. Community-based occupational therapists can involve engineering and design students on projects to create devices that would address areas of need for their clients.

Regardless of the context, occupational therapist participation in interdisciplinary projects promotes the field to professionals and scholars in other disciplines, many of whom might not otherwise interact with rehabilitation professionals. The collaborative research experience at the IDEA Center demonstrates the potential for occupational therapists to make contributions outside of the medical services model, specifically as research and usability consultants. Universal design researchers lead these efforts with other design professions, and it is critical that current and future occupational therapists realize the importance of their role as students, faculty and practitioners in the movement.

Benefits disclosure

James Lenker and Brittany Perez are both employed by the IDEA Center, which has a financial interest in the content of this article and the broader field of universal design.

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