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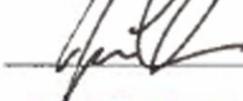
Thesis Title: Universal Design | Evaluating Equal Opportunity

Abstract (200 words max): This thesis analyzes the fundamentals of universal design by examining what disability is and how good design impacts people. By looking at award winning universal designs, I evaluate UF's first universal dorm, Cypress Hall, through the eyes of student's with disabilities who live there.

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College of Design, Construction, and Planning

Honors Thesis, Spring 2018

Universal Design | Evaluating Equal Opportunity

Lisa Ryzhikov

Following ADA (Americans with Disabilities Act) building codes in design is the accepted standard in architectural practice, but one might ask why? Although architects generally consider ADA compatibility on a daily basis, few architects have direct personal experiences with being disabled. These “accessible” components, or lack thereof, create barriers, factors in the environment that limit functioning, for all users. Universal design, design that can be accessed equally by all, is the elimination of these barriers. Since ADA has become the minimum standard, it no longer serves those who it seeks to enable; instead it hurts the people who need it the most.

Disability... What’s That Anyway and Why Should We Care?

People with disabilities are the largest minority in the United States and the world. The 2010 Census states that 1 in 5 Americans have a disability, which equates to 56.7 million people, nearly 19% of the population.¹ As a society and as designers how do we respond?

Disability is a term that is thrown around a lot in American culture, but what is it actually? A disability, in legal terms, is attributed to “intellectual, psychiatric, cognitive, neurological, sensory or physical impairment or a combination of those impairments” which affects major aspects of daily life.² However this definition does not begin to scratch the surface of what it means to be disabled.

Individuals can be born, acquire, or have temporary disability. The most common type of disability, and the most apparent, is physical. About one third of the U.S. population has mobility challenges; This includes difficulty walking/physical exhaustion to needing to use a wheelchair, walker, or prosthetics.³ It is engrained in our society to stigmatize those who appear different than us, but with 1 in 5 American’s identifying as disabled, attitudes need to shift. Especially with the rising aging population.

¹ "Nearly 1 in 5 People Have a Disability in the U.S., Census Bureau Reports." *US Census Bureau Public Information Office*. May 19, 2016.

² "What Is Disability?" *Home Disability Services*. November 15, 2012.

³ "Nearly 1 in 5 People Have a Disability in the U.S., Census Bureau Reports." *US Census Bureau Public Information Office*.

In contrast to physical disabilities, there is another major type of disability which society completely overlooks: those that are “invisible.” As the name suggests, these types of impairments are those that are not initially evident but have just as a significant impact as physical disabilities. In many cases, these two types of disabilities coexist.

Some of the most prevalent invisible disabilities in America include: mental illness, hard of hearing, poor eyesight, brain injury, neurological disorders (i.e. epilepsy), learning disabilities, HIV/AIDS, and diabetes. Concerning two types mental illness alone, 7 million adults report having such severe depression or anxiety that they have trouble living their lives. However, this number may be higher since mental illness is often underreported, or they are grouped as effects of an existing disability.⁴ The biggest stigma against those with invisible disabilities is that society (and even doctors) labels them as “lazy” or “fakers.” As someone with an invisible disability who is often confronted with skeptics, I always ask them one question: why? Why would anyone want to be anything other than healthy? These questions, especially when asked by doctors, teachers, and work professionals, often bring about more issues that hinder people from being able to lead healthy and confident lives.

It is important to recognize and be informed of the impacts of disabilities on the population; however, it is also crucial to realize that health and ability can change during a lifetime. It is naive to think “that can’t happen to me.” We are all vulnerable to accidents and various medical conditions which may not yet be apparent.

What is Universal Design?

The ADA building codes do not always serve good design because “when we design for the average user, we accommodate for a few people [those without disabilities] well”.⁵ However, today’s architects view ADA codes as legally necessary and fail to see accessibility as a design opportunity. When

⁴ “Nearly 1 in 5 People Have a Disability in the U.S., Census Bureau Reports.” *US Census Bureau Public Information Office*. May 19, 2016.

⁵ Cynthia A. Leibrock and James Evan Terry, *Beautiful Universal Design: A Visual Guide*. (Hoboken, NJ: John Wiley & Sons, 1999). XVI.

architects address “universal” design as an addition to the original concept, it is less successful and emphasizes differences between users. For instance, not only is a slapped-on ramp ugly, it often does not even meet the needs of its intended audience.⁶

Many people only feel disabled when they cannot do something. In most cases a disability is caused by societal exclusion, like systematic barriers and negative attitudes. This is called the Social Model of Disability which states that an individual is not themselves disabled (although they are impaired in some way), but due to inflexible norms, society fails to include those with differences; meaning that someone with an impairment must live a more difficult life than they otherwise would. This is especially evident in architecture. For example, someone in a wheelchair cannot choose where to sit in a lecture hall because wheelchair seating is only in the front or back row. This not only segregates the individual from others but hinders typical interactions which can cause extreme mental stress.

With proper universal design, the final goal is to eliminate barriers which segregate people from interacting normally with the architecture and those around them. Universal design is intuitive, and in turn, makes architectural spaces easier to enjoy. This can be accomplished by techniques all architects employ during the design process: Contrast, lighting systems, and material selection (visual impairment), noise barriers and controlled sounds (hard of hearing/ mental health), controlling excess stimuli (mental health), and simplified floor plans. These considerations benefit all users.⁷ All architects approach design in unique ways, however if we prioritize these universal design rituals, we can facilitate universal design by providing new opportunities to be creative.

⁶ Ibid., 1.

⁷ Ibid., XIII-XV.

Who Benefits from Universal Design?

The answer is everyone. Universal design is vital because all of us are impaired in some capacity during our life time, even if it's only temporary. On average every American will break two bones in their life time.

As children, we all have experienced helplessness. Many spaces, depending on program, are designed with "average" adult measurements in mind, in turn, making it hard for children to reach door handles, sinks, water fountains, and other everyday components. The same is true for circulation. Long stair cases are not only difficult for children to climb, they are challenging for older people to use as well. Large, confusing floor plans make it easy to become disoriented and exhausted, whether disabled or not. Hospitals are major offenders of this. Instead of thinking about the patients' experience, designers focus on functionality for machines and administration. New additions try to mend the confusion, but exacerbate these issues. Clear design should be addressed from the beginning.

Just feeling ill or taking medications can also affect the way people use and interact with architecture. With many medications, severe or unavoidable side effects may occur, such as drowsiness, weakness, and vertigo, all of which can limit a person's ability to function normally within a space.

Simply complying with ADA building code causes many problems. By using universal design tactics, the concept of normality within design vanishes, therefore opening new possibilities and opportunities for architects and their clients to address everyone's needs. When architects build universally, the benefit is shared by both present and future populations.

Criteria for Success | Case Study

In 1997, the University of North Carolina outlined sensible and flexible guidelines for universal design. The 7 guidelines are:

1. **Equitable Use:** Provide the same (or equivalent) experience for all users. Make designs appealing to all.
2. **Flexibility in Use:** Provide different choices on how to navigate and provide adaptability.
3. **Simple and Intuitive Use:** Design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
4. **Perceptible Information:** Communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
5. **Tolerance for Error:** The design minimizes hazards (provides warnings) and the adverse consequences of accidental or unintended actions (fail safe features).
6. **Low Physical Effort:** The design can be used efficiently and comfortably and with a minimum of fatigue.
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.⁸

What is important to note is that these criteria are not impossible to meet, but to the inexperienced architect, these broad aspects can turn into confusion. Therefore, many look to the ADA code as a guideline that quickly turns into the “safe” thing to do. There are many prestigious awards that are given to designers who create innovative elevators, toilets, door knobs, and other small components. However, it is difficult to find a beautiful building that also meets the 7 principles. The biggest challenge facing architects is how to incorporate our new technology into a well-designed building.

⁸ "The 7 Principles." *Centre for Excellence in Universal Design*. 2012.

University College Dublin Student Centre | Case Study



In 2012, the Irish firm Fitzgerald Kavanagh and Partners (FKP), built a new student center for the University College Dublin (UCD). This project later won a top award from the Royal Institute of Architects of Ireland (RIAI) for the best universal design in 2013⁹, and is a prime example of a building that meets the 7 principles of universal design.

This project is unique because the architects at FKP relied mostly on student input to drive design concepts. Additionally, “an independent accessibility audit was commissioned to establish best practice solutions for all users of the facility, both within the campus and from the wider community.”¹⁰ This way, students and community were able to express their exact design needs, resulting in a compelling, and unique universal design.

The centrally located UCD Student Center is 11,000 square meters. It contains a 50-meter swimming pool, gymnasium, dance studios, debating chamber, 3D cinema, drama theatre, radio studio, seminar rooms, and a café.

⁹ “UCD Student Centre, Winner 2013 RIAI Universal Design Award.” *Centre for Excellence in Universal Design*. 2013.

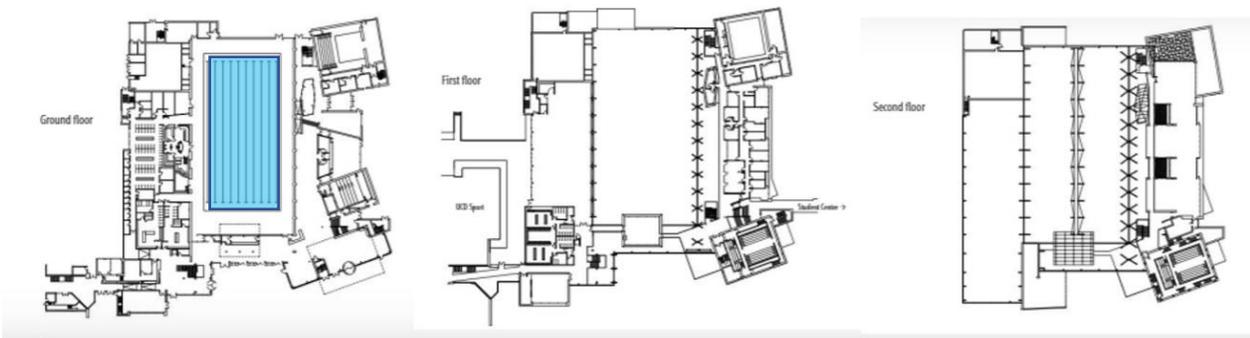
¹⁰ “UCD Student Centre, Winner 2013 RIAI Universal Design Award.” *Centre for Excellence in Universal Design*. 2013.

Equitable Use: The entrance to the student center is flat so everyone can easily enter the building. Every part is accessible to all students. Counters, desks, and even video screens are either low or have a dual height. Elevation changes on individual floors are minimal, but very narrow ramps and excessively wide stairs are segregated by a solid guardrail (top photo on page 9).

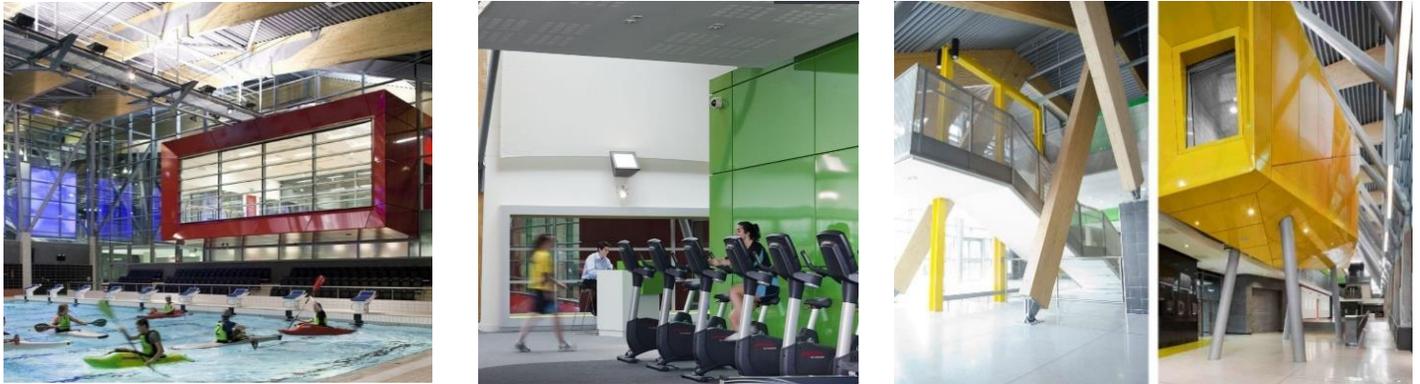


Flexibility in Use: There are no hallways, each room is connected to each other providing ample room to move around. Furniture is spaced out and easily reconfigurable, and there are almost no permanent components except for circulation desks. Even the tepidarium

has no steps, except into the baths. This illuminates possible barriers for physically disabled users.



Simple and Intuitive Use: The plan of the student center is clear and easy to navigate. It is rectangular and comprised of smaller square modules which vary in size. The pool is at the center and all the activity rooms float around this centralized space. This makes it easy for individuals to orient themselves and determine where they would like to go. Also, there are only 3 floors, vertical movement is minimal compared to other student centers



Perceptible Information: Color plays a large part in this design. Red, green, and yellow are the three major colors representing the sports center, changing rooms, and the university's radio pod respectively. As you move through the building, these colorful elements help the user to instantly recognize where they are. The material palette used throughout vary in texture and contrast, making it visually stimulating and easy to "read."



Tolerance for Error: Underneath some stair cases there is no safety guard preventing someone who is totally blind, or someone not paying attention, from hitting their head. The red underbelly signals that it leads to the fitness center, but for someone who can't see well, they will walk towards the red volume, not knowing it is a stair.



Low Physical Effort: One of the most physically taxing experiences in a building is navigating vertical movement. In the student center, elevation changes among floors are minimal and the elevators are centrally located. The photo above shows the only apparent grade change on the first floor. There are also many opportunities to rest as one moves through the building.



Size and Space for Approach and Use:

Some ramps and walkways are very small creating difficulty when a wheelchair user needs to push their chair. Outside, there are automatic doors, but on the inside, there are

none. Long, skinny door handles are put in place so anyone of any height or hand size can open the doors. However, the lack of push plates or automatic doors means that people without the use of their arms cannot open doors. ¹¹

¹¹ Fitzgerald Kavanagh and Partners, *A Day in the Life: UCD Student Centre*. (Ireland, 2012).

Final Thoughts: In a country where there is virtually no code for accessible components, this building is commendable. Despite a few gaps, The UCD Centre goes beyond the minimum criteria to provide equal accessibility. The designs success can be attributed to FKP’s collaboration with the university, and an independent accommodation agency to provide a space that was not just accessible, but universal for all users.

University of Florida Cypress Hall Dormitory | Case Study



The first universal dorm, Cypress Hall, on the University of Florida (UF) campus was opened in the Fall of 2015. This is a smaller dorm only housing 255 beds. The ground floor is communal, the first has 35 large, single bed, ADA compliant rooms, and the 2nd and 3rd floors are large standard dorm rooms that are not wheel chair accessible. Cypress is located on the East side of campus and is near “on-campus dining options, Broward Recreational Center, libraries, Steinbrenner Band Hall and sorority row.”¹² This dorm was meant to be inclusive and to give students with physical disabilities an equal university experience. To

¹² "Cypress Hall." *Housing and Residence Education: University of Florida*. Date last modified: 2/12/2018.

evaluate how universally accessible the dorm really is, I drew from the personal experiences of two residents, Hailey and Brad, and from my own experiences with disability.

Hailey is a 3rd year neuroscience student who plays tennis and is passionate about photography and the arts. She lived in Cypress for a year and a half and now lives off campus independently. Her roommate and therapeutic companion is Rosie, a now two-year-old black and white ragdoll who can't meow but plays fetch and is trained to sit on Hailey's chest whenever her heart rate is elevated, or she is about to have a seizure. Hailey was born with Ehlers-Danlos Syndrome which is a connective tissue disorder but became paralyzed from the waist down (L2 lumbar injury) her senior year of high school due to medical malpractice. She usually uses a manual wheelchair to get around and can take a few steps around her apartment, although it is often painful to do so. Although Hailey now must use a wheelchair, she has an optimistic outlook and welcomes life's challenges with full force.

Brad is a second-year psychology student who is very active in UF clubs including Cru, psychology club, and is involved with the UF psych research lab which studies bullying. He was born with Cerebral Palsy (CP) which is a neurological disorder caused by a brain injury to or malformation of the cerebellum that occurs while the child's brain is under development.¹³ Although intelligence is not affected by CP, it impacts motor functions like limb movement and speech. Since Brad's joints are very stiff, he mainly uses a motorized wheelchair and a walker to exercise. Brad is a charismatic guy who aspires to be a counselor for children who have disabilities after he graduates.

My name is Lisa and I am a fourth-year architecture student. I am a dancer, watercolor artist, and do film photography. My first semester at UF I acquired a brain injury and this spring semester I was diagnosed with Narcolepsy type 2, a rare sleep disorder which causes perpetual sleepiness, sleep paralysis, weakness, hypnagogic and hypnopompic hallucinations (dreaming when you are about to sleep

¹³ "Definition of Cerebral Palsy." *Cerebralpalsy.org*.

and waking up), among other symptoms. My brain injury has affected my speech, eyesight, and ability to walk long distances. Even now, 3 years later, I still have difficulty with my vision and experience severe headaches. My narcolepsy makes me so tired it affects my ability to walk and I have the propensity to collapse without warning. These unfortunate experiences have sparked my interest in universal design because in Hailey's, Brad's, and my own words we feel that "no one cares about disabled people."

Through our collective experiences and help from Heidi, Cypress resident and current Inter-Residential Hall Association (IRHA) president, we will evaluate Cypress Hall on the 7 Principles of Universal Design.



Circle indicates closest sidewalk approach that a wheelchair user can access.

Equitable Use: One issue you immediately notice is that there is a step up to the main entrance of the dorm. If Brad or Hailey want to enter through the front doors, they must to go around to the side and use the sidewalk which ramps up slightly to meet the door. Since the dorm is built into a slope, at one end of the building the ADA floor is about 5 to 6 feet off the ground. Thus, to provide direct access to the ADA floor there is a winding ramp that can be tiring to use due to its many turns.

The 1st floor is the only floor with ADA code rooms. In theory, the ADA rooms would be neighbors with standard rooms, but students without physical disabilities can only rent the rooms if they are vacant. In the lobby and common spaces universal design is successful, where the experience is nearly the same of all users.



Flexibility in Use: The dorm room themselves are entirely customizable. Each dorm has a full bed, dresser, and desk. In Brads room, he even has a ceiling track system (this feature is available in select rooms) which helps him transfer out of his bed and to the bathroom. Brad also has his

dresser and mini fridge elevated for easy reach. These modifications were completed once he moved in and figured out what he needed. Cypress has staff which can come modify rooms at any time.



Simple and Intuitive Use: Cypress floor plan is L shaped. The hallways are wide and open so if one stand at the crook of the L, one can see to the end of both hallways. When one enters the dorm, the front of the lobby is double height space. This helps organization since natural light pour onto the floors through the large windows, indicating the entrance. Since this is a dormitory, it's uses are intuitive with centralized rooms for different activities like studying, hanging out, or cooking.



Perceptible Information: The lobby walls are painted white and the floors are dark making it easy to clearly see the edges of different spaces. There is also a centralized front desk which provides 24/7 assistance to residents. On the 1st floor, the laminate flooring (tan) and walls (green) are both different colors to indicate the edge of spaces, but there is not much contrast between the colors. A wood buffer along the walls prevents residents from bumping

their equipment into the concrete walls. At Cypress, and all over campus, scooter parking and disabled parking access lane have the same white hatched lines. Due to these conflicting parking colors, many scooters will park next to cars in disabled spots and then access is blocked.



Tolerance for Error: Neither Brad nor Hailey have had any accidents in Cypress as a result of poor design. However, they still express difficulty using the stacked dyers and the stove. Each floor has two central washers and dryers and located next to the kitchen. The two washers sit side by side however the two dryers are stacked even though there is ample room to place the top dryer on floor level. Neither Hailey

with ease, but for Hailey, who has a manually operated chair, it requires much more physical exertion to cover the same distance as Brad because she must push harder and longer.

Once inside Cypress, moving around is easy. Many other dorms on campus do not have elevators for student use, meaning that many of the dorms were not accessible for students who have physical disabilities. The communal/lounge spaces are made of very low carpet while the hallways and dorm rooms have laminate flooring, both of which Hailey and Brad can walk over with ease. Since the doors are all automatic, there is no need to strain to open the door and maneuver a chair around it. This also means that the users' chair (which can be as expensive as a small car) will not get damaged.



Size and Space for Approach and Use:

The entrances to the dorm, hallways, lounges, and the dorms rooms are large and spacious. Once one steps off the elevator and into a small lobby, the resident holds their key fob and the doors slide open. All the doors on the 2nd floor have push plates, so residents

can easily open their door. The bathrooms are spacious, and a wheelchair can easily roll up to the shower.

Final Thoughts: Brad and Hailey both love Cypress Hall. It has given both of them a more genuine college experience and has provided Hailey with the confidence to successfully live on her own. Cypress has a positive emotional effect on its residents because nearly all of them have experienced issues accessing the architecture around them, including in their own homes. It is important to note that although Cypress is not perfect, it considers universal design and provides a positive experience for all users.

The rent at Cypress is more expensive than other dorms on campus, but that is mostly because it is new, and the rooms are spacious. One good thing to note is that ADA single rooms cost the same as standard single rooms. The rent per semester of a single room is 3,783 dollars totaling to nearly 8,000 dollars a year (not including summer semesters).

In terms of campus planning, Cypress Hall's location should have been considered more. Its immediate context fails the Low Physical Effort criteria. By locating it at the bottom of a hill and the edge of campus, it makes it more difficult for residents to get to class. The concrete sidewalks are in disrepair and cause issues for Hailey and Brad. Hailey has fallen out of her chair from holes in the concrete and from shifts between slabs. If Brad pops a wheelchair tire, he cannot move, and will have to wait for the wheelchair company to come and fix it.

Often times, these discrepancies have to do with political agendas within the university. The new chemistry building was built at the same time as Cypress, but because of the main donor's contributions, they were able to select the site for the new building which is in a central part of campus on top of the hill. This site would have been better for Cypress Hall residents because it is near Library West, Mid Town, Turlington, the football stadium, and other vibrant parts of campus. These areas of campus would be easier to access since residents would walk slightly downhill to go to class. Part of an architect's job is to educate the client and challenge their initial assumptions. Often, architects fear challenging the client and the status quo, however it is also the architects' responsibility to communicate with the client and educate.

Another missed opportunity for Cypress is that the ADA and standard dorm rooms should be neighbors, thus equitable experience is jeopardized for both parties. The ADA floor is segregated from other students who don't live on that floor. Students without disabilities do not see those from the ADA floor unless they both are in communal spaces at the same time. By having both types of rooms together,

students without disabilities would live with and learn from those that do. This teaches students to be empathetic to fellow students' situations and therefore people with disabilities in general.

In addition, the equitable use of Cypress fails due to the amenities put in by the client post construction. These includes the stacked dries (when there is ample room to put them elsewhere) and having a non-accessible stove on the ADA floor's kitchen

To implement universal design, architects must play many different roles well to succeed. In addition to being an architect, they must be educators, sociologists, psychologists, social activists, structural engineers, and builders. By seeing the world through these multiple lenses, universal design becomes something that everyone appreciates, but does not initially notice. The best universal design is successfully integrated and invisible.

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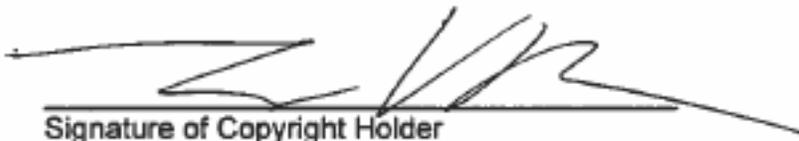
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