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Accessibility Consultation, Environmental Modifications, and Universal Design

Shoshana Shamberg, OTR/L, MS, FAOTA

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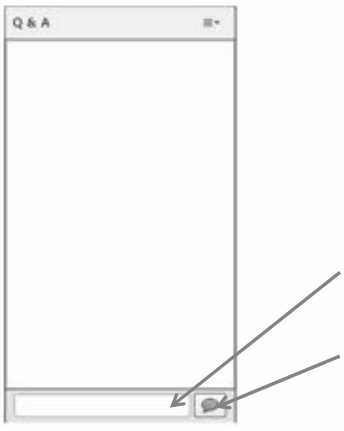

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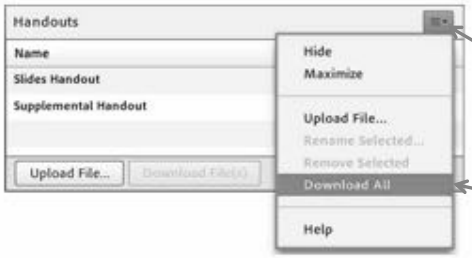

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Accessibility Consultation, Environmental Assessment, & Universal Design

Accessible and Universal Design of Public and Residential Spaces

Presenter:
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TRAINING OUTLINE

- **30 minutes: Framework for Accessibility Consultation:** Accessible & Universal Design Guidelines/Philosophical & Practical Approach to Independent Living with a Client Centered Service Delivery/Home Access, Jobsite Accommodations, and Community Access
- **30 minutes: Maximizing Function and Minimizing Intervention**: Aging in Place/Functional Limitations and Environmental Barriers/Home Safety/Children's Environments/Case Studies
- **30 minutes: Functional And Environmental Assessments:** Conducting a Comprehensive Environmental Assessment/Documentation/ Liability Issues/ The Accessibility Team: Networking And Communicating With Building Professionals/Assistive Technology And Architectural Products.
- **20 minutes: Case Study Videos, Universal Design, and Problem Solving Session**
- **10 minutes: Summary / Question and Answer**

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By the end of the training, each participant will:

- Recognize issues of compliance with accessibility guidelines and program practices related to the rights of people with disabilities.
- Identify accessible design guidelines and building codes and their impact on public policies and the private sector.
- Describe the types of assistive technology, adaptive equipment, and specialized/common architectural products used to maximize independence, accessibility, and safety.
- Recognize how to conduct a comprehensive environmental and functional assessment to determine the impact of environmental barriers on a person's ability to perform daily activities and recognize potential solutions from low tech to high tech to provide options.

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- Identify the basic principles of universal design of residential, long-term care, and public settings.
- Describe the effects of functional decline and limitations due to aging and disability on safety, independence, and use of the environment. .
- Recognize collaborative relationships, interdisciplinary team building, and the benefits of including an accessibility consultant on a design/build team.

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The Interdisciplinary Team

Accessibility Consultation Professionals

Medical rehabilitation professionals

OTR/OTAs, RPT/PTAs, rehab nurses, social workers, case managers, vocational counselors, rehab engineers

Building professionals and designers

architects, interior designers, landscape architects, building contractors, civil and mechanical engineers, building inspectors

Miscellaneous

disability advocates, lawyers, independent living center advocates, housing agency personnel

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Unique Skills of an Accessibility Consultant

- Assessment of environmental barriers
- Assessment of functional abilities and limitations
- Task analysis and grading of activities
- Ergonomics and body mechanics
- Medical knowledge, pathology, psycho-social
- Architectural design, AT, and specialized products
- Problem solving, stress management, energy conservation
- Holistic approach
- Team building and networking of community resources

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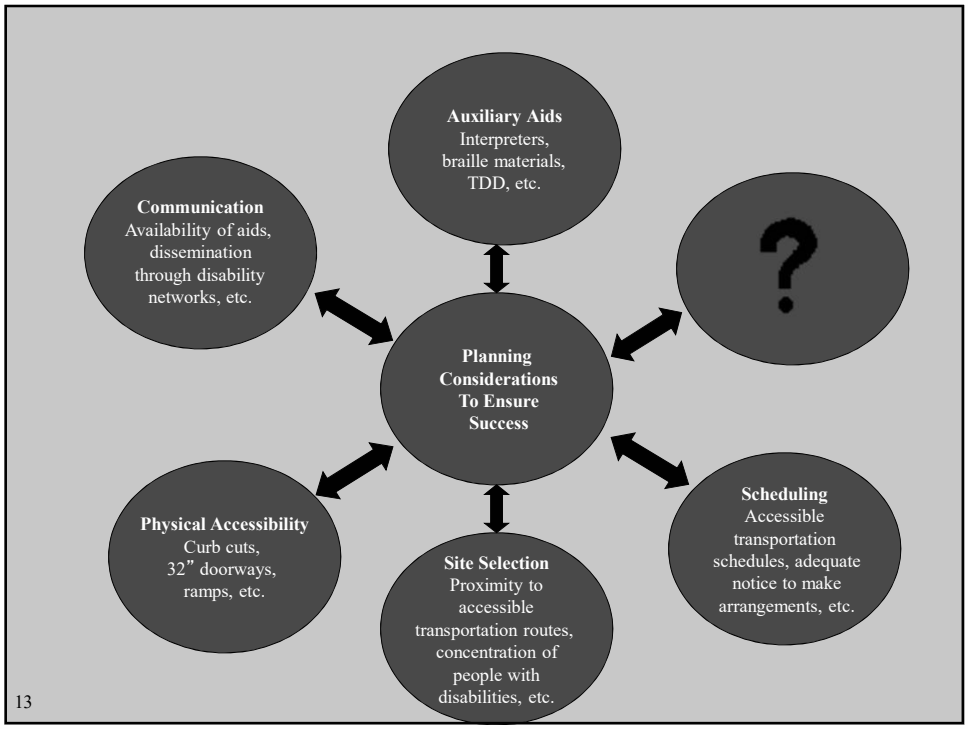
Legislation Concerning Individuals with Disabilities

1968	Architectural Barriers Act (PL 90-480)	All new federally constructed, leased or financed buildings and facilities, as well as buildings assigned for public use, must be designed, constructed and altered so as to be accessible to and usable by individuals with physical disabilities.
1973 (1978,1986)	Rehabilitation Act (PL 93-112)	No otherwise qualified individual with disabilities in the United States…shall , solely by reason of his/her disability, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance or under any program or activity conducted by any Executive Agency or by the United States Postal Service.
1988	Fair Housing Amendment Act (PL 100-430)	Title VIII of the Civil Rights Act of 1968 (the Federal Fair Housing Law) was extended to cover individuals with disabilities. HUD has authority to initiate enforcement actions and to penalize those who discriminate in the sale, rental, or financing of housing.



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Design and Construction Provisions for Fair Housing

Requirement 1	Accessible Building entrance on an accessible route
Requirement 2	Accessible and usable public and common use areas
Requirement 3	Usable doors
Requirement 4	Accessible route into and through the covered dwelling unit
Requirement 5	Light switches, electrical outlets, thermostats and other environmental controls in accessible locations
Requirement 6	Reinforced walls for grab bars
Requirement 7	Usable kitchens and bathrooms

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Standards for Accessibility

- ANSI
- MGRAD/ABA
- UFAS
- FHAAG
- ADAAG
- Local building codes

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Solutions May Include

1. **No cost/low cost – Under $1000**
   - Rearranging the environment or performance task
   - Utilizing low cost assistive devices
   - Minor modifications to existing equipment or environment
2. **Medium/high cost - $1000-5000**
   - Providing medium priced specialized products or assistive devices
   - Moderate alteration of the environment (widening doorways, etc.)
3. **High cost – above $5000**
   - Architectural modifications and high end products
   - Major retrofit and construction of accessible and adaptable features
   - New construction based on Barrier Free Design, Universal Design, Adaptable Design Principles, Life Span Design

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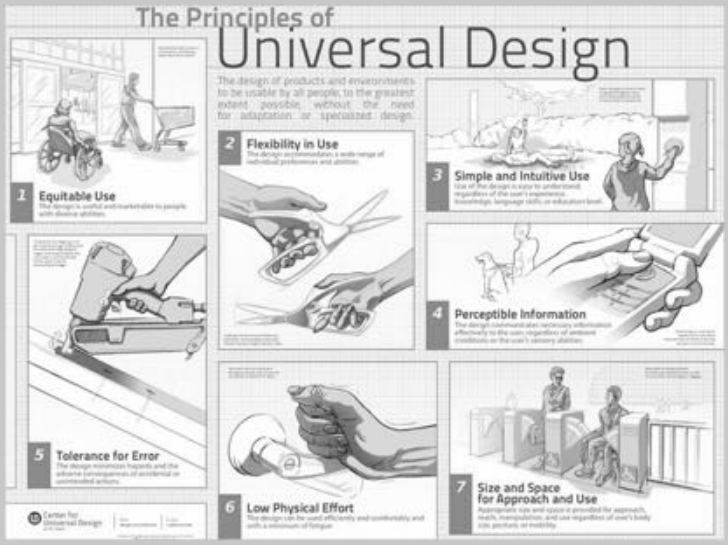
7 Principles of Universal Design



Ideas for Creating an Accessible Home

Environmental Assessment

Residential and Commercial Elements

- Parking/Driveway
- Walkway: direct, unobstructed route to entrance
- Entrances/Doorways
- Outdoor and Indoor Stairs/Lifts/Ramps
- Hallways
- Kitchen
- Living Room/Dining Room/Bedroom
- Bathrooms
- Basement
- Utilities
- Safety/Security/ Emergency Systems

Additional considerations for multi-family and commercial environments:

- Specific parking regulations
- Accessible design of common use areas
- Commercial elevators, wheelchair lifts, water fountains, telephones
- Signage and wayfinding
- Access to transportation

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Common Environmental Elements

- Indoor and outdoor lighting
- Locations of switches and outlets
- Handles and controls
- Floor surfaces
- Widths and maneuvering spaces within rooms
- Environmental supports
- Contrasting surfaces: color, patterns, and textures
- Space planning and type of furniture
- Clutter and organization
- Window design and management

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Observe Client for Problems During Daily Functioning

- Parking the car and accessing the exterior entrance
- Walking, stepping, climbing walkways and stairs
- Opening/closing handles/doors
- Lock/unlock doors
- Operate light switches/electrical plugs
- Type and degree of lighting
- Open/close curtains, windows
- Move from one room to another and through each room without obstructions
- Access/use toilet
- Walk up/down the stairs

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Observed for Problems with General Functional Issues Accessibility

- Mobility on floor & ground surfaces
- Access to and use of environmental controls: thermostat, breaker boxes, security system, emergency call system, intercoms, entertainments systems
- Safety issues: unobstructed access/location and use fire extinguishers, understand and post fire escape plan, use/location of carbon monoxide detectors and smoke alarms

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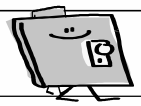
Standard Features and Measurements of Environmental Design

Entrance	One no-step entrance/ handrails both sides 2” diam
Doorway	24” clear space on latch side 32” – 36” clearance
Hallway	42” wide
Space	5’x5’ diameter turning space
Wall	10”-24” high solid blocking/ Wing-it fasteners/studs
Environmental Controls	19”-24” from floor
Accessible Hardware	On doors, sinks and cabinets Levered handles/ electronic/ C or D handles
Clearance	Counter tops: 28”-36” high with 26” knee space



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Standard Features and Measurements of Environmental Design

Showers	60”x30” with slope ¼” for every 12”(min)
Closet	Adjustable 48” from floor with storage access of 18”-43”
Toilet	15”-18” high
Window	30”-36” sill height
Mirrors	30”-31” high
Wiring	For instillation of environmental controls: lighting, doorbell, climate control, telephone
Lighting	Non-glare, sconces or shaded, awnings, shades 3-4x greater for visually impaired
Contrasting	Counters with wall, floors with wall, steps, outlets, wall switch, toilet seat and floor, bathtub edges

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Parking

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Driveways and No-step Entrances

- Location
- Garage/covered overhang
- Surface type/condition
- Grading/sloping
- Drainage
- Width
- Lighting

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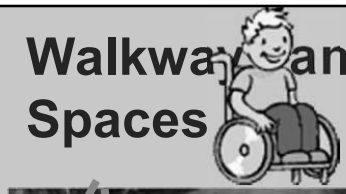
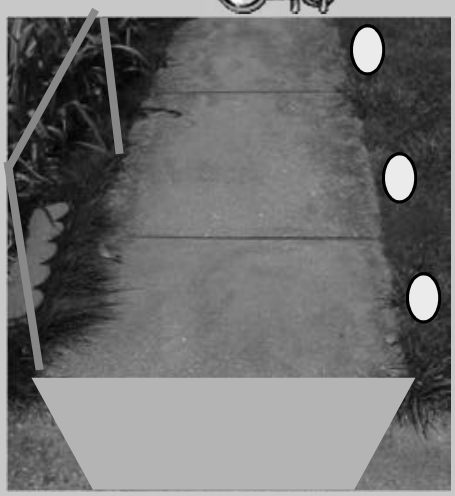
Walkways and Outdoor Spaces





- Install railings on at least one side of walkway
- Patch holes, cracks and uneven pavement
- Install motion detectors on lighting
- Use reflectors/low voltage outdoor lighting along walkways and driveway
- Address gardening and lawn maintenance

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Entrances and Exterior Stairs

Look at:

- Height of steps – 7” riser
- Number of steps
- Railings – 1.5” – 2” diameter
- Ramps – 1:20 slope
- Doorways – 36” wide
- Door hardware – levered, push type, automatic
- Threshold – level with floor
- Lighting - switches

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Entrances

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Entrances

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Doorways

- Install rubberized or non-slip surface stair treads on steps
- Illuminate doorways
- Levered door handles/loop or push type
- Ramp and widen door openings for wheelchair access
- Mail chute at chair height (28” – 36”)

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Doorways

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Hallways and Living Rooms

- Level thresholds between rooms
- Low pile, dense carpeting/remove throw rugs
- Non slip surface on wood or linoleum floors
- Contrast colors between wall/floor
- Accessible outlets
- Remove low profile furniture
- Firm sturdy sofas and chairs
- Avoid busy patterns the increase visual confusion
- Sound absorption materials

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Interior Stairways

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Interior Stairways

- Handrails on both sides extending at least 12” past top/bottom of stairs
- Illuminated or contrasting reflective stair strips
- Non-skid surface on stair tred with 7” consistent riser
- Handrails with ergonomic grasp 2”diameter
- Scrolling on railing for directional cues
- Additional lighting-non glare – low to floor

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Kitchens – The Good

- Pull out shelves and cutting boards
- Height adjustable counter tops/ appliance installation
- Appliance controls on front or side

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Kitchens – The Good

- Additional lighting
- Open cabinets for wheelchair accessibility
- Shallow cabinets and sink

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Kitchens – The Good

- D-ring cabinet handles / pull out drawers, baskets, shelves
- Wall oven or microwave at accessible height with small shelf in front
- Contrasting color surfaces and textures

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Kitchens – The Good

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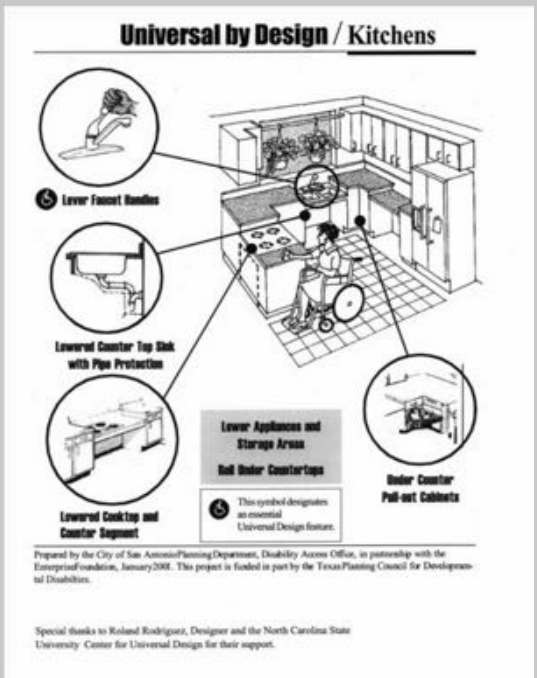

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Kitchens – The Ugly

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Bathrooms - Shower

- Roll in shower
- Non-skid floor
- Attractive grab bar
- Retractable shower seat or tub with transfer tub bench
- Specialized bathtub/ remove sliding glass shower door and use shower curtain

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Bathrooms - Sink

- Single levered/automatic faucet controls/ temperature controls
- Lighting related to activities
- Lowered or angled wall mirrors
- Environmental supports/ storage

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Bathrooms - Toilet

- Access to toilet with turning radius (5 ft x 5 ft), paper, flusher
- Grab bar support/retractable bars, transfer space
- Height adjustable toilet seat

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Bedrooms

- Minimize need for furniture to increase/open space
- Open/close drawers
- Minimize clutter/maximize organization
- Access switches/plugs
- Accessible height/firm mattress
- Remove throw rugs
- Accessible laundry room on bedroom level with wheeled car

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Closets

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Basements, Utilities and Laundry Safety and Security

- Basement:
  - Lighting
  - Clutter
  - Stairs
- Utilities and Laundry:
  - Location
  - Washer door
  - Controls
  - Work area
- Safety and Security:
  - Intercom
  - Emergency call system
  - Security system
  - Fire extinguisher
  - Heat sensor for stoves
  - Emergency indoor lighting
  - Smoke alarm
  - Fire escape plan
  - Clutter

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Major Issues to Consider in Children's Environments

- Varying grasp strengths, types of handles for grasping, and hand sizes for different age levels
- Functional issues of strength, manipulation, and motor control

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Major Issues to Consider in Children's Environments

- Varying heights of work surfaces for varying age levels
- Creating at least one accessible route throughout each exhibit
- Cognitive issues of directions, mapping, and understanding goals of activities

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Major Issues to Consider in Children's Environments

- Sensory deficit accommodations for visual and hearing impaired
  - auditiory and visual cues, large print and Braille, alternative media, wayfinding
- Parent and child issues for supervision and accommodation
- Alternative means of participation-reasonable accommodations

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Issues for Park and Playground Play

- **Child Cognitive Development Objectives**
- **Child Physical Development Objectives**
- **Physical Activity Goals**
- **Programming Goals**
- **Environmental Factors**
- **Site Design Program**
- **The Physical Environment**

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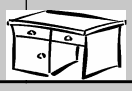
Ergonomics

Ages 5 – 11 Years Old							
	Child Height	Eye-Level (Standing)	Overhead Reach (Standing)	Eye-Level (Sitting)	Overhead Reach (Sitting)	Desk Height	Chair Height
Small Child	40” – 45”	39.1”	46.6”	30.9”		17.5”	10.5”
Average Child	46” – 48”	43”	51.6”	33.5”		19.4”	11.5”
Large Child	49” – 54”	48”	57.5”	36.9”			13”
Child in a WC				40.8”	48.7”		19.5”

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Child Cognitive Development Objectives

- Develop concepts of
  - In ,out, through, across, over, under, under, up, down, high and low
  - Shapes and colors
  - Conservation of materials, volume and measurement
- Improve orientation and develop special concepts
- Stimulate
  - Auditory discrimination
  - Visual awareness
  - Tactile awareness
  - Reading and math functions
- Develop
  - Interactive / communication skills
  - Tasks and role performance
  - Understanding consequences of own actions

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Child Physical Development Objectives

- Improve upper body strength

- Improve lower body strength
- Improve eye hand coordination
- Improve gross and fine motor skills
- Improve balance

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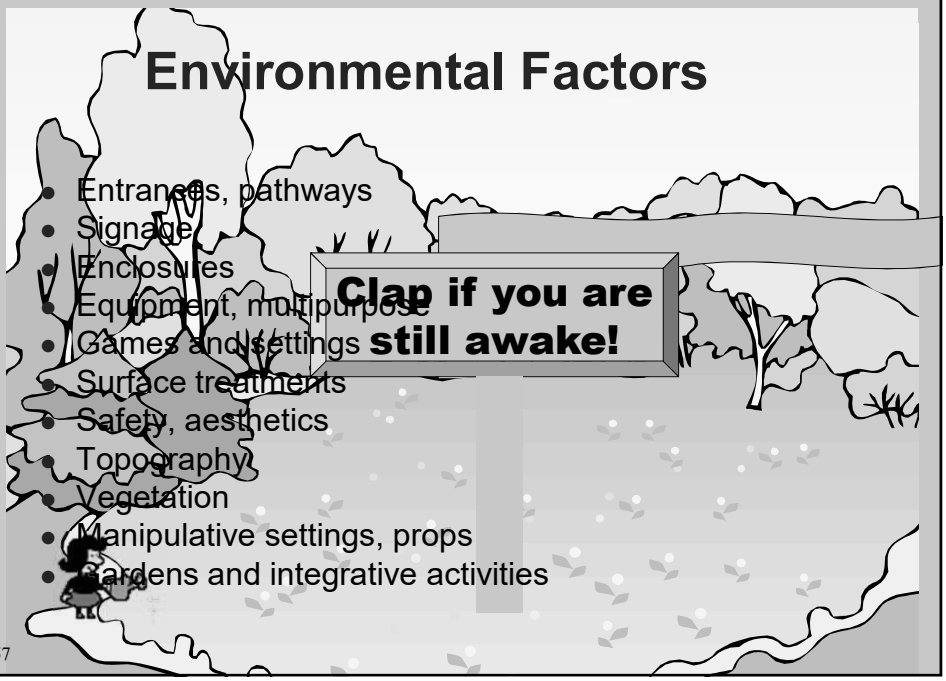
Physical Activity Goals

- Vertical and horizontal circulation
- Climbing
- Sliding
- Rocking
- Spiraling
- Transferring, transitioning
- Cognitive activities

Programming Goals

- Needs assessment / audience
- Safety and accessibility guidelines
- Evaluate emotional risk factors
- Evaluate passive recreational needs
- Understanding site constraints and opportunities
- Neighboring social environment
- Establishing Budget
- Maintenance considerations
- Physical amenities

Environmental Factors

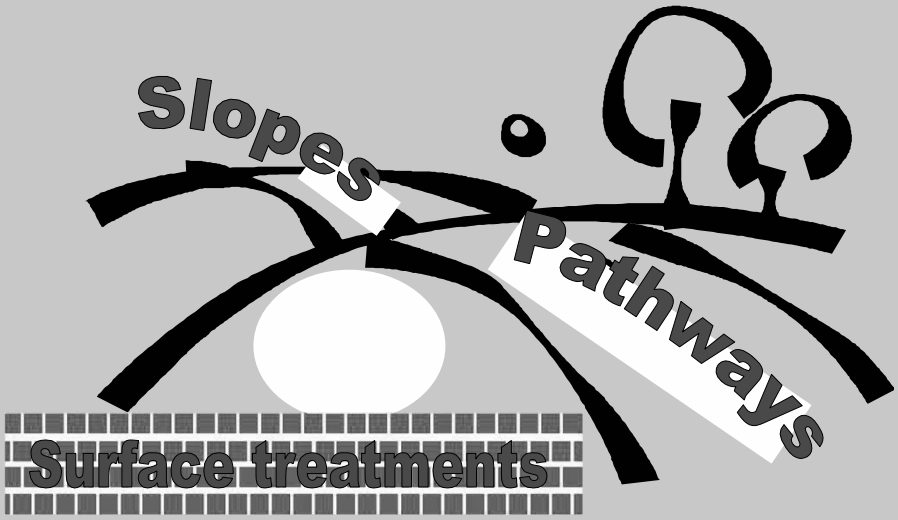


- Entrances, pathways
- Signage
- Enclosures
- Equipment, multipurpose
- Games and settings
- Surface treatments
- Safety, aesthetics
- Topography
- Vegetation
- Manipulative settings, props
- Gardens and integrative activities

Site Design Program

- **Accessibility**
  - Visible Entry
  - Minimize interaction between children and traffic
  - Clear pathway routes between play area and adjacent use areas
  - Create clear borders and edges for all use areas
  - Create 10 ft wide path for maintenance vehicles
  - Transition hard through soft surfaces
  - Scale furniture to children's size
- **Safe Challenges**
- **Balance Challenges and Risks**
- **Diversity and Clarity**
- **Environmental Familiarity**
- **Graduated Changes**
- **Flexibility**
- **Defensible Space**
- **Multi-Sensoral Stimulation**

The Physical Environment



Surface Treatments

- Firm and Stable: Material that does not shift when subjected to normal pressures

Pathways

- Width between 44"-88" wide and headroom of 80"
- Thresholds not to exceed 1/4"
- 1/2 thresholds with 1:2 beveled slope.
- Narrow paths should have a passing lane every 100'
- Bridges and curves provide excellent solutions for path diversity
- Transparent mazes and intersecting loops to promote continuity of movement and exploration

Slopes

- 0-1% is considered level,
  - 1% cross-slope is necessary for drainage.
- 2-4% is considered optimal
  - 0-4.9% is not considered a ramp.
- 5% or greater is considered a ramp (ADA) and must have
  - edging
  - handrails
  - a maximum run of 30'and then a landing with a 60" radius.
- Ramps over 8% slope must be covered.
- Surfaces of slopes areas must be made of non-slip surfaces.

Related Websites

- The ADA Checklist for Readily Achievable Barrier Removal
  http://www.usdoj.gov/crt/ada/checkweb.htm
- For the long form, for new construction or renovation, the ADAAG Checklist
  http://www.access-board.gov/adaag/checklist/a16.html
- National Clearing House for Educational Facilities
  http://www.edfacilities.org/ir/playgrounds.cfm
- Adaptive Environments Center
  www.adaptenv.org

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Accessibility for Aging Adults

- Privacy
- Social Interaction
- Control/Choice/Autonomy
- Orientation/Way finding
- Safety/Security
- Accessibility/Manipulation
- Stimulation/Challenges
- Sensory Aspects
- Familiarity
- Aesthetics/Appearance/ Non-medical
- Personalization
- Adaptability

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UD Design Principals LTC

- Use of natural lighting
- Windows looking out onto busy street
- Landscaping and natural surroundings
- Bring neighborhood indoors
- Homelike atmosphere
- Glass partitions to increase space
- Aesthetic visual cues
- Shopping close by
- Easy access to outside

Changes to the Body when Disability Occurs

- Physical changes

- Sensory changes

- Cognitive changes

- Psychosocial changes

Physical Changes

- Mobility and Posture
- Changes in center of gravity and distribution of weight
- Range of Motion
- Muscle Strength
- Muscle Tone
- Coordination
- Gross Motor
- Fine Motor
- Activity Tolerance

Sensory Changes

- Vision
- Hearing
- Touch
- Smell
- Taste
- Perception
- Balance
- Tactile Sense

Visual Changes

- **Lens of the eye thickens affecting:**
  - Acuity
  - Figure ground perception
  - Light and dark perception
  - Lighting requirements
  - Depth perception
- **Lens may yellow affecting:**
  - Color perception
  - Light requirements
- **Muscle controlling pupil dilation may be sluggish affecting:**
  - Changes in lighting intensity
  - Glare tolerance

Visual Changes (continued)

- **Trauma or disease may cause:**
  - Visual field loss
  - Partial blindness
  - Total blindness
- **Cognitive changes may affect visual perceptual function**
- **Visual changes may increase danger of falls due to:**
  - Mobility problems
  - Environmental obstacles

Vision Solutions

- Rearrange the furniture to compensate for reduced visual field
- Avoid clutter
- Use contrasting colors to define surfaces, walls, stairs
- Install tactile indicators on handrails to indicate the beginning and end of stairs
- Use non-glare lighting with dimmers and multi bulbs
- Use light filtering window coverings
- Use magnification devices and adaptations on computer, TV, and for reading

Hearing Changes

- Total or partial loss of hearing
- Decreased discrimination of type and intesity of sound
- Difficulty distinguishing background from foreground noise
- Diminished quality of sound

Hearing Solutions

- Use audible and visual alerting signals for:
  - Doorbell
  - Telephone
  - Smoke alarm
- Use vibrating signal for bed to alert when sleeping
- Amplification device on telephone, TV, etc.
- Close captioning
- Use TDD/TTY, relay system, email and fax machine for communication
- Utilize sound absorbing materials such as carpeting, fabric upholstery, and wallpaper
- Arrange furniture to crease small groupings, seating facing one another

Tactile Changes

- Difficulties with sensation
- Problems discriminating hot and cold
- Decreased sensation of pain and pressure

Tactile Solutions

- Vary textured surfaces
- Anti-scald devices for water faucets
- Turn down water heater to 115 degrees or less
- Use stove top with staggered burners to avoid reaching over hot surfaces
- Use stove tope with front or side controls
- Avoid sharp edges on counters cabinets and furniture
- Use large handles, controls and easy gripping surfaces on tools
- Use electronic controls on doors, faucets, windows, etc.

Olfactory Changes

- Total and partial loss of smell
- Difficulty detecting smoke/natural gas
- Inability to detect spoiled food

Olfactory Solutions

- Use gas stove in well ventilated area
  - Install gas leakage indicators for water heaters, heating systems, dryers, and stoves using natural gas fuel
- Install smoke alarms in key locations on each level of home
- Date all opened and /or prepared foods both refrigerated and non-refrigerated items

Cognitive and Perceptual Changes

- Orientation
- Safety awareness
- Judgment
- Problem solving
- Organizational skills
- Visual perception
- Auditory perception
- Memory
- Ability to follow directions/sequencing
- Attention span/concentration
- Body awareness
- Directionality--R/L discrimination
- Ability to manage medicine
- Learning new skills
- Expressive language
- Comprehension
- Cueing requirements

Cognitive and Perceptual Solutions

- Utilize high contrast, large lettering or signage providing
  - Environmental cues for locations of emergency exits and equipment
  - Directions to specific areas
  - Directors for use of appliances and other equipment
- Color code hot/cold water
- Organize and design the environment with minimal clutter, patterns, and colors that blend into one another
- Remove items in the environment that may compromise safety

Coordination and Balance Changes

- Difficulty with smooth and accurate movement

Coordination and Balance Solutions

- Design environment with open, unobstructed space and access routes
- Use sturdy, wheeled cart to transport items
- Eliminate excessive reaching, bending and climbing
- Use sturdy, firm furniture with seating that is easy to get up/down from with arm support
- Use extended handles on tools
- Environmental supports such as handrails and grab bars

Psychosocial Changes

- Self esteem
- Role changes
- Death of spouse/friends/pets
- Change in location of support system
- Retirement
- Changes in functional ability
- Community demographic changes
- Changes in health status
- Stress tolerance/coping skills

Psychological Illnesses:

- Depression
- Manic episodes
- Irrationality
- Denial
- Dementia
- Financial resources
- Pain management

Get involved with & learn from professionals providing complementary services: advocates, architects, builders, rehab engineers, interior and industrial designers, landscape architects, etc.

When visiting other communities & countries learn about new ideas, products, & services to support safety, independence, & quality of life

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Develop relationships with local, statewide & national organizations, legislators, leaders, & advocacy groups

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Highlight your successes with media attention, presentations, & articles educating others about the importance of your services

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Create informative resources to educate & advertise your services

Creating a Sensory Smart Environment for Learning, Working and Health

Shoshana Shamberg, OT, MS, FAOTA, Irlen Diagnostician

1. Filter all lighting sources. Turn off fluorescent lighting and use LED dimmable lighting (energy efficient) or incandescent/halogen lighting (not energy efficient but healthy for eyes and brain).
2. Reduce light levels or adjust to comfortable levels to minimize stress and maximize function. Some people function better under dim lighting and others under bright lights. Minimize glare and bright lights with shades, curtains or blinds, and dimmers on switches and positioning of light sources.
3. Do not sit directly under bright or fluorescent lighting to minimize glare. Use night lights low to the ground to minimize glare and provide comfortable levels. Shield bare bulbs with shades, sconces, recessed, etc.
4. Use a slanted easel to rest books and writing materials to help maintain ergonomically beneficial positioning. Sit at table with 90 degrees at hips and knees with feet flat on the floor or a firm surface. Back is upright with lumbar curve respected and positioned with ergonomic chair or adapted cushion.
5. Avoid reading and writing materials on bright white paper with dark text. Use the most comfortable colored background on paper, computer screen, and phone to produces the least amount of stress. Irlen Clings are made for decreasing stress when using a computer monitor (Order www.irlen.com). Irlen Overlays can also be taped over the computer screen, cut to fit books, or placed over the TV monitor.
6. Avoid high contrast on reading /math materials, handwriting, TV and computer monitors, and busy patterns on walls, furniture, and carpets. Paint walls with subdued colors that produce calmness and alertness.

Simple Accommodations

Lighting (see side panel ideas)

Use colored overlays & clings
Use colored paper for math/reading
Colored paper for writing
Use HWT paper on colored paper. Use graph paper for math.
Use a writing easel & bookstand
Book position
Use hats with visors
Colored backgrounds on PowerPoints, whiteboards, overhead projectors
Chalkboards and white boards: write in column, graphing, & use colored background & colored text
Use highlighter & colored file-cards.

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References and Resources

- Quick Reference to Occupational Therapy
  Kathlyn L. Reed, PhD, OTR, Aspen Publishers
- Quick Reference Guide to Physical Therapy
- Abilities OT Services Accessibility Consultation Manuals & Videos, On-Site Seminars, and Internet Mentoring Programs

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