Design for Autism Spectrum Disorders: A Sensory Approach

Swedish National Conference on NDDs

KAROLINSKA INSTIUTET

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Texas Tech Coalition
for Natural Learning

OUTLINE

PERCEPTION/COGNITION/ SENSATION

METHODOLOGY

RECOMMENDATIONS TO ALLEVIATE TACTILE SENSITIVITY

RECOMMENDATIONS TO ALLEVIATE VISUAL SENSITIVITY

RECOMMENDATIONS TO ALLEVIATE AUDITORY SENSITIVITY

Who? Why?

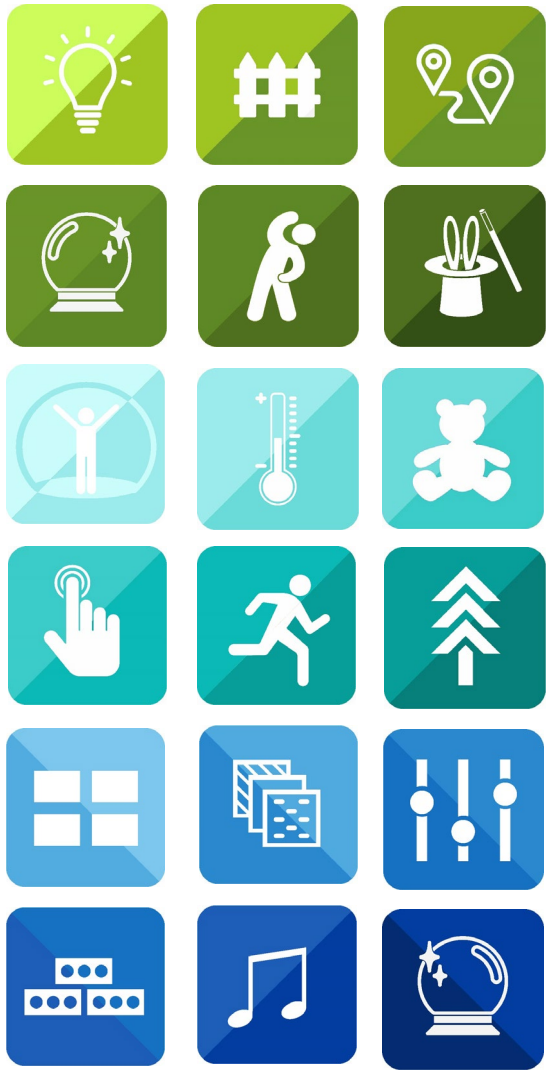
In the United States

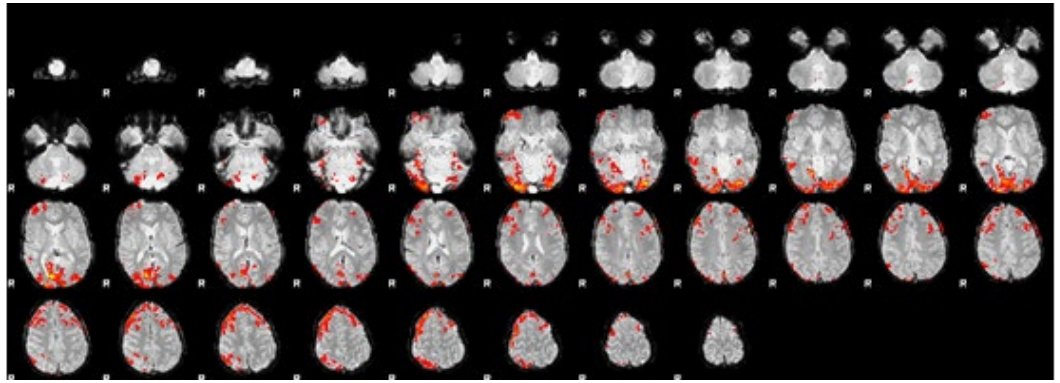
- Autism Spectrum Disorders (2020 - CDC) 1 in 54
  - 1 in 34 boys
  - 1 in 144 girls

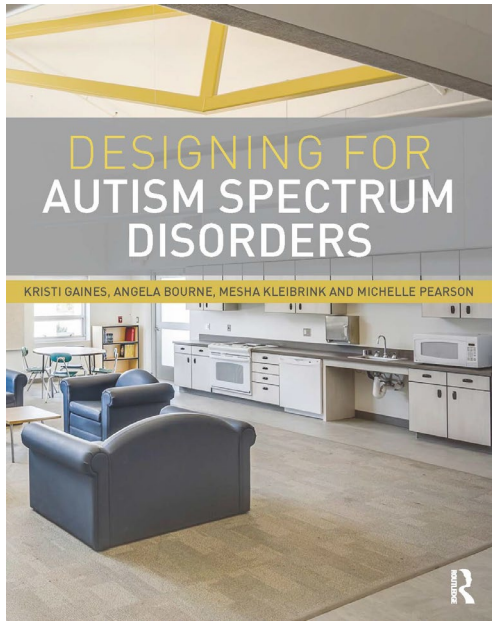
Research Methods

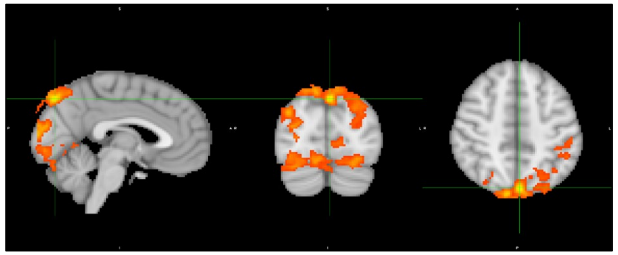
- Sensory Integration Theory
- 800+ Participants
- Product Research
- fMRI technology/Virtual Reality
- Interviews/Observation
  - Three Studies
- Surveys
  - Three Studies

DESIGN FOR INCLUSION

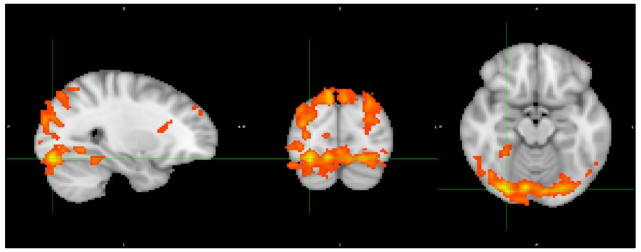




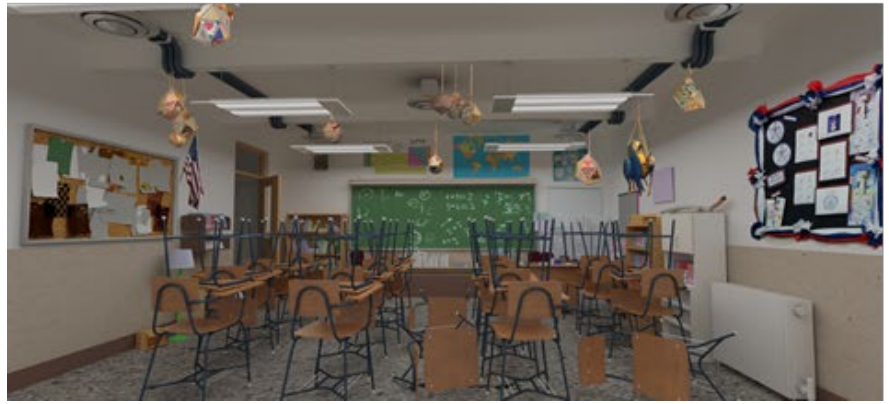




Low Clutter Stimuli; NT > ASD



Direct Sunlight Stimuli; NT > ASD



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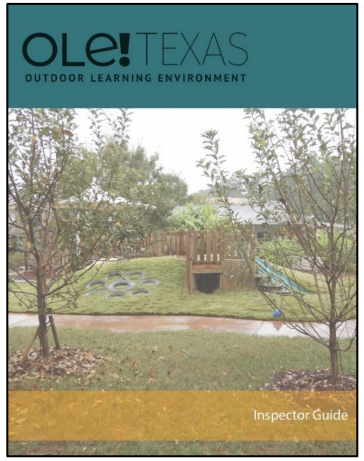
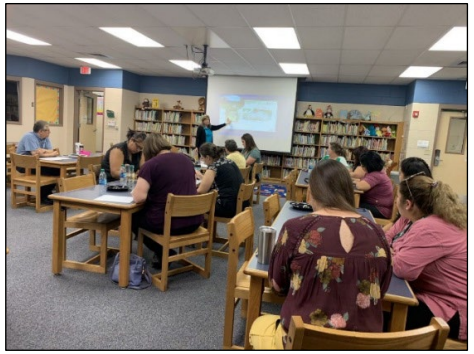
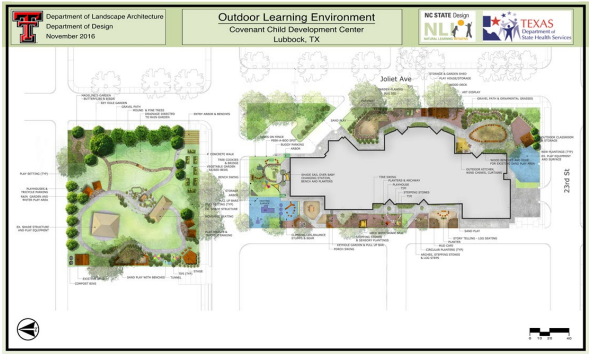
Winner of the 2020 Presidents Emerging Engaged Scholarship Award



- Multidisciplinary partnerships
- Publications
- Design Workshops
- Volunteer Workdays
- Designer Training
- Teacher Training
- CEU Presentations
- Dissemination of Research
- Federal, state, and local funding
- Resource "Hub"





TASTE

SMELL

MOTION

VISUAL

TOUCH

AUDITORY

TACTILE DESIGN CONSIDERATIONS

PERSONAL SPACE

PRESSURE

TEMPERATURE

PHYSICAL ACTIVITY

SOFT&SMOOTH TEXTURES

NATURE

Tactile (Touch)	Touches people and objects unnecessarily; Has abnormally high pain threshold (does not appear to be hurt after a hard fall) Does not appear to feel extreme temperatures	Avoids wearing certain fabrics; Becomes distressed during grooming; Does not like being wet or going barefoot; Reacts negatively to being touched

Gaines, K., Bourne, A., Pearson, M., & Kleibrink, M. (2016). *Designing for autism spectrum disorders*. Routledge.

PERSONAL SPACE

- A variety of small group seating arranged at right angles, which include high backs, and upholstered seats provide a cocooning affect.
- Allow for private spaces
- Provide adequate room to transition through the environment without touching people
- Break-out spaces in classrooms

TEMPERATURE

BALANCE HEAT AND HUMIDITY

- Finding a balance in ***temperature*** may be challenging for individuals with SPD, and quick ***temperature*** changes can be alarming.
- Heat and humidity may create the need to cool off through separation of others
- Heat may also increase unpleasant bodily odors

FEEL

- ***Soft*** bedding, pillows, blankets are preferred
- ***Smooth*** metallic surfaces more positive reaction than rough metallic surfaces
- Preference for ***smooth*** shiny surfaces in interiors

PRESSURE

PRESSURE

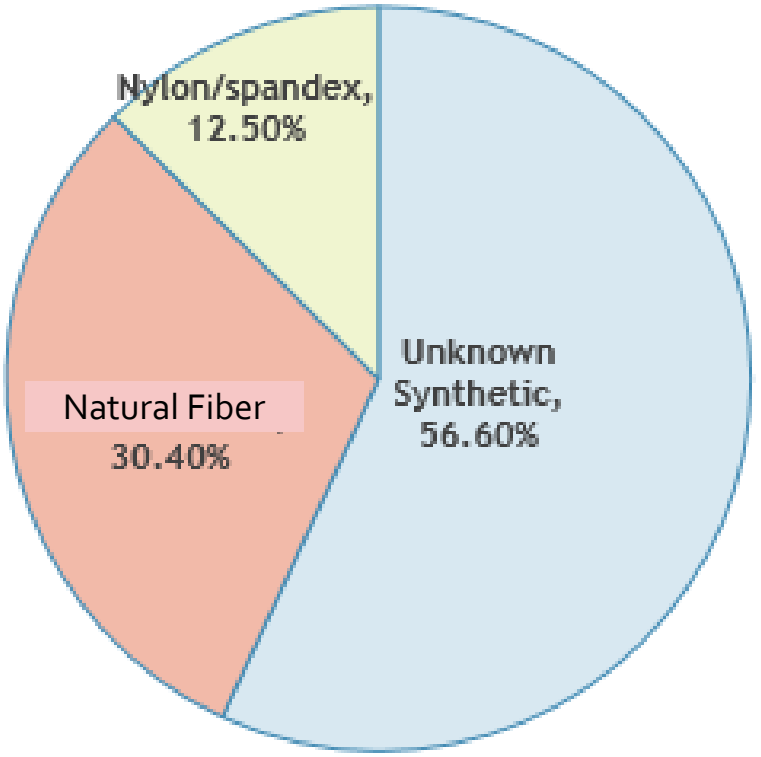
Design factors related to sensory issues for children with TD.

- Size Fit Issues
- Fabric fiber contents
- Myth of one unified design for various children with TD.
- Expensive but may not relieve tactile sensitivity

SOFT & SMOOTH

Fabrics related to Tactile sensitivity

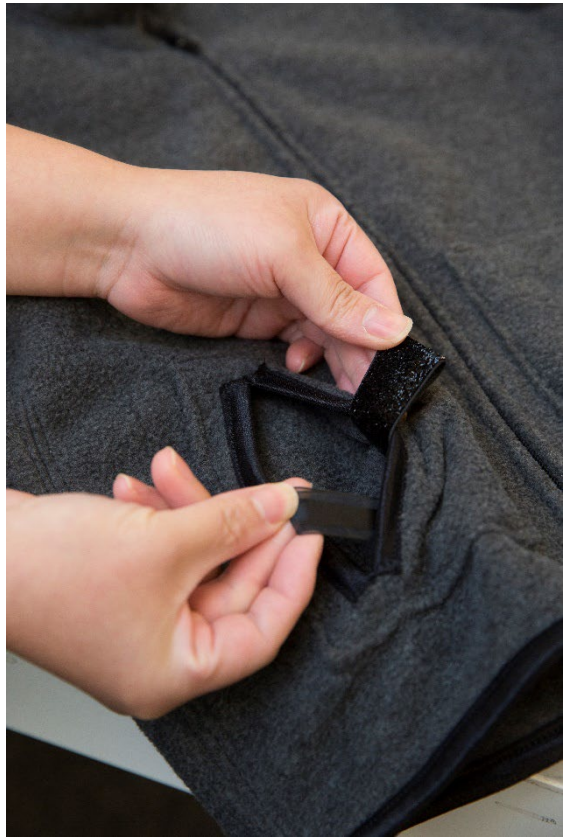
- Clothing with certain textures may create undesirable noise
- Children often complain about discomfort of clothing.
- Of the therapy clothing, 69.57% were made of synthetic fibers
- Only 30.43% were natural fiber (e.g. cotton, wool).



SENSORY CLOTHING

- Temperature Control
- Soft & Smooth
- Pressure

SENSORY CLOTHING



ACTIVITY

NATURE

Benefits of Outdoor Time for Children's Development

- **Socio-Emotional Development:**
  - Reduced stress
  - Promotes self-confidence
  - Improves social relations
- **Physical Development:**
  - Reduces myopia
  - Increased physical activity
  - Gross and fine motor skills
  - "Safe" risk taking
  - Opportunities to use all senses

Cognitive Development:

Greater attention spans

More exploration than indoors

Creativity

Opportunities to explore curiosity

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VISION

LEGIBILITY

PREDICTABILITY

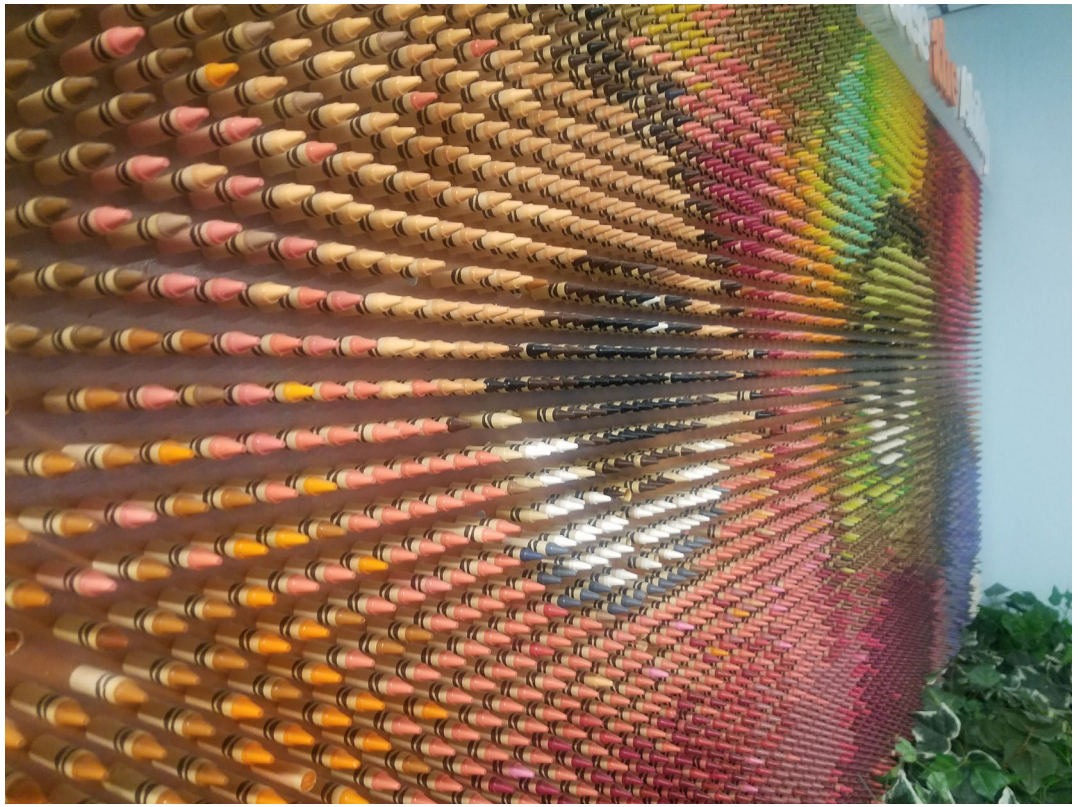
BOUNDARY

FLEXIBILTY

TRANSITION

HIDDEN

See the Ability



Visual (Sight)	Disregards people or objects in environment, can see only outlines of certain objects, likes bright colors and bright sunlight	Bothered by bright lights (covers eyes or squints); Easily distracted by movement; Stares at certain people or objects

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LEGIBILITY

THROUGH COLOR

Color is one of the most influential aspects of an environment with both psychological and physiological reactions

- Physiological & Psychological Effects
- Saturation/Intensity
- Hyposensitive
  - Bright Colors
  - High Contrast
- Hypersensitive
  - Subdued
  - Blues & Greens
- Color-Coding communicates purpose

LEGIBILITY
THROUGH PATTERN

Design Recommendations

- Visual patterns that are not boring, but not overwhelming.
- Avoid high contrast patterns, for example black & white.
- Use rhythm & pattern to organize the space.
- Helps code a space to communicate with the complex mind, breaking it down into parts that make up a whole
- Spatial Queuing through patterns and colors assist in spatial comprehension (Grandin, 1996).

BOUNDARY

PROVIDING GUIDANCE

Boundaries communicate where an activity or space begins or ends.

- Are they clear?
- Opaque versus clear
- Minimize visual distractions
- Avoid large open areas
- Use flooring, furniture, screens and color to communicate boundaries
- Combination of visual cues and physical boundaries

BOUNDARY

PREDICTABILITY

ALLEVIATE STRESS & INSTILL CONFIDENCE

- Design considerations for **predictability**:
  - Organize elements in a predictable manner. Symmetry.
  - Straightforward and easy to navigate.
  - Spatial Sequencing: Associating a specific space with a correlated activity.
  - Furnishings and architectural details can communicate the purpose and
  - Clear sight lines
  - Landmarks to trigger previous memories of the space.
  - Compartmentalization – a purpose for each space.
  - Change can create stress.

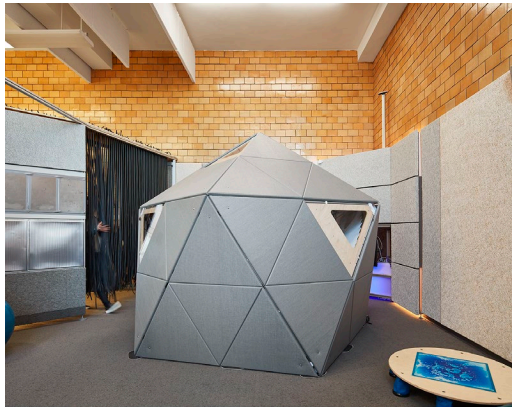
PREDICTABILITY

FLEXIBILITY

FOR UNIQUE NEEDS

- Accommodates individual unique needs.
- Grants control over the environment.
- A space can be flexible and compartmentalized simultaneously.

HIDDEN



AUDITORY

LAY-OUT

CONSTRUCTION

MATERIALS

MUSIC

CONTROL

PREDICTABLE

Sense	*Hypo-sensitive*	*Hyper-sensitive*
Auditory (Sound)	Does not respond when name is called; Enjoys strange noises; Enjoys making loud, excessive noises	Overly sensitive to loud noises; Appears to hear noises before others; Cannot function well with background noise

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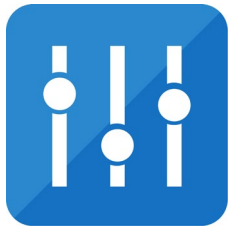
PREDICTABILITY

ALLEVIATE STRESS & INSTILL CONFIDENCE

- Prepare for sudden or unexpected noises
- “Muffle” loud speakers
- Design spaces for intended use
- Provide opportunities to promote social engagement
- Provide Safe Spaces
- Build Tolerance to unexpected noises



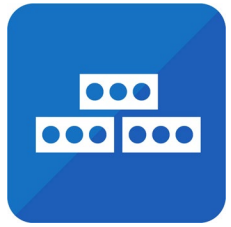
CONTROL

- Design for privacy
- Provide choice and autonomy
- Smaller, subdivided furniture arrangements
- Escape Spaces
- Sensory spaces
- Operable windows

LAY-OUT

ZONING, ADJACENCIES, TRANSITION AND BUFFER SPACES

- Consider the level of sound spaces typically produce
- The desired level of sound for tasks
- Example: a noisy gym located next to a classroom is not ideal. Similarly, the play room and sensory integration space are located on the noisier side of the home
- Placement of noisy rooms
- Locate the closet and/or bathroom on the corridor wall as a sound buffer



CONSTRUCTION

- Ceiling height
- Wall construction
- Windows
- Lighting
- Avoid direct passageways or connections between classrooms
- Stagger doors along a hallway
- Increase the amount of insulation
- Shape and location of duct work
- Location of air handling units

MATERIALS

Select sound absorbing materials

- Specify carpet instead hard flooring
- Wood products also tend to have more absorptive properties than many laminates
- Drapery Panels
- Acoustical Panels

MUSIC

- Soft background music can reduce the impact of excessive auditory stimulus.
- Using headphones blocks out excess noise or allows for listening to preferred music
- Auditory integration: listening to digitally modified music through headphones to help auditory hyper-sensitive adaptation
- Nature sounds

MUSIC

CONCLUSION

The goal of these recommendations is not to create a “bubble” for individuals with sensory integration issues but to help them learn to cope with the environment.

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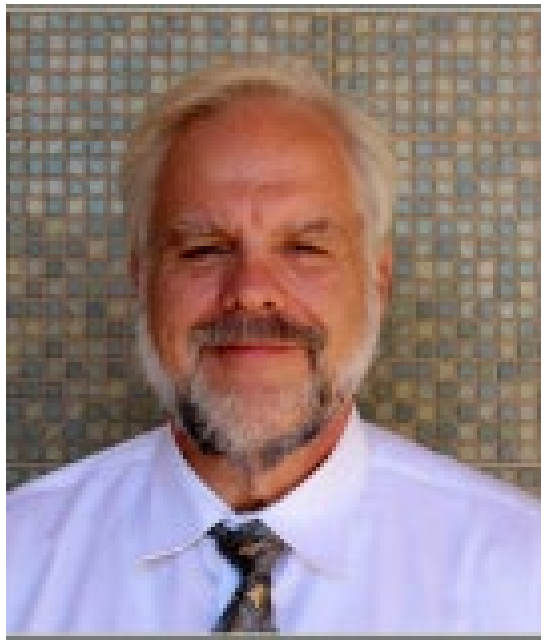

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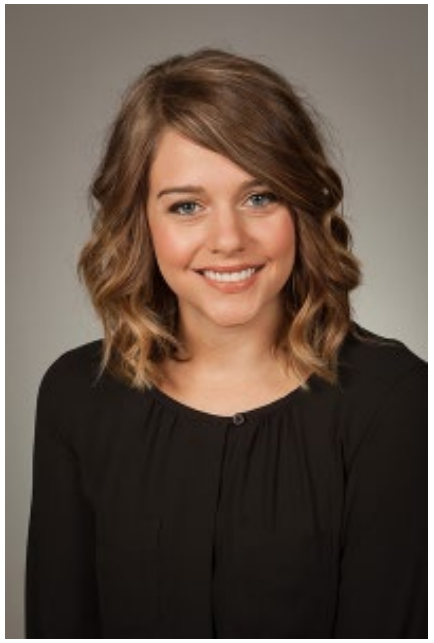

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OLE! TEXAS
OUTDOOR LEARNING ENVIRONMENT

USDA NIFA
United States Department of Agriculture
National Institute of Food and Agriculture

Graduate School

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Centers for Disease Control and Prevention
National Institute of Food and Agriculture
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Questions?

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