VISION'S INFLUENCE ON THE BODY AND MOVEMENT

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"Focus" Conference

Topics

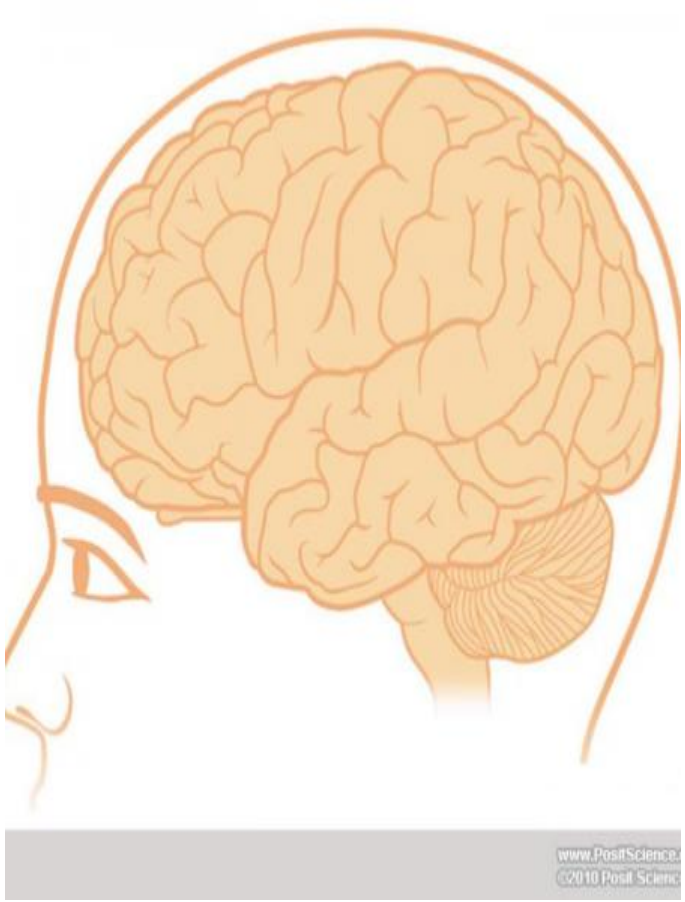
- Normal brain and body development
- Roll of vision in development of posture and balance
- How to set up activities to promote posture and balance in individuals with a vision impairment.

Bones make up a basic skeleton

- The bones grow in length and strength as we develop.
- The pressure and weight that we put on our bones help them to grow.
- Our joints change shape and become deeper and stronger as we put weight through them.

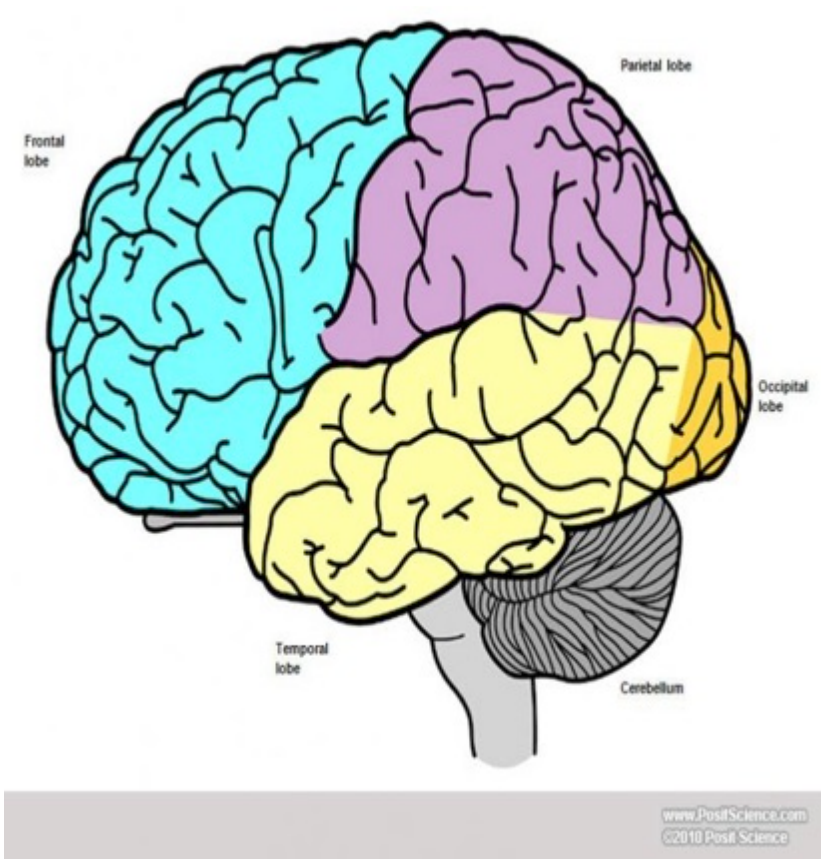
Muscles

The Brain



- Our brain tells our muscles when and how to move.
- The left side of the brain controls movement on the right side of the body.
- The right side of the brain controls movement on the left side of the body.

Outside of the Brain

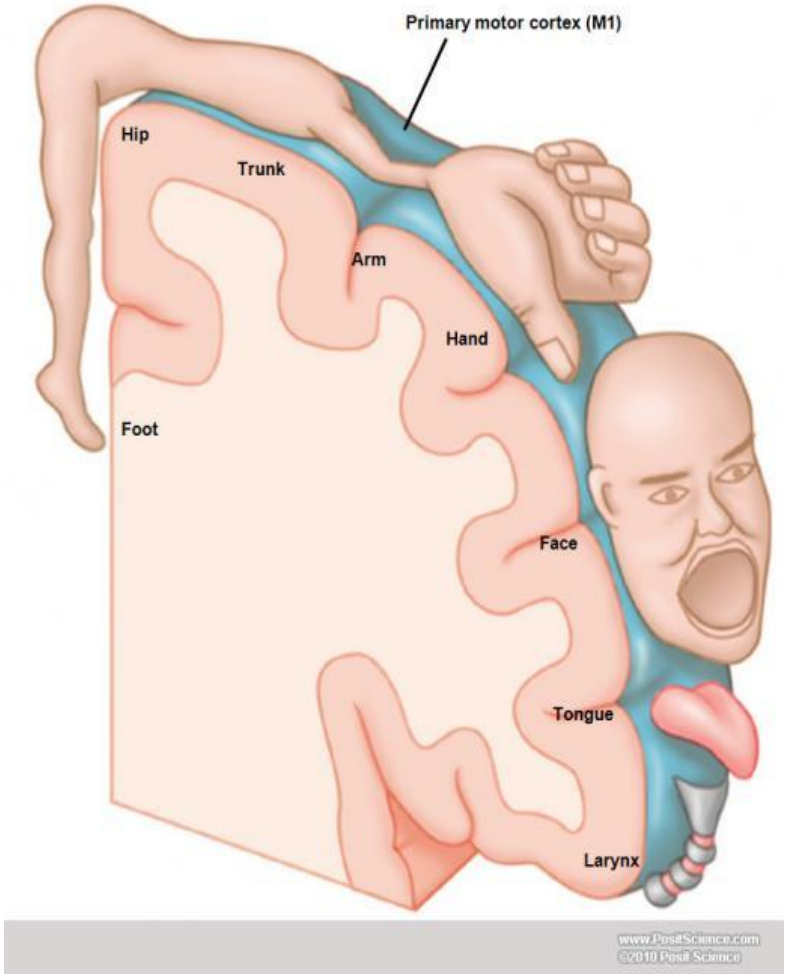


- Different parts of the brain are important in controlling different parts of movement.
- Depending on where in the brain the injury is will determine your symptoms

Parts of the brain

- Frontal lobe
  - Creative thought, problem solving, intellect, judgment, behavior, attention, abstract thinking, physical reactions, muscle movements, coordinated movements, smell and personality
- Parietal lobe
  - Language, reading, tactile sensation and sensory comprehension
- Temporal lobe
  - Hearing and speech comprehension
- Occipital lobe
  - Vision

Motor Cortex: The Part of the Brain that controls Movement



What can go wrong at the brain?

- Too much fluid can put pressure on the brain tissues
- Bleeding - stroke
- Blood clot - stroke
- Parts of the brain do not develop
- Parts of the brain cannot communicate with each other

Vision Impairments can be the result of disorders of the eye, muscles, nerve, or brain.

- Retinopathy of prematurity
  - One of the most common causes of blindness in children
  - Abnormal blood vessel growth in the retina
- Optic Nerve Hypoplasia
  - Underdeveloped or absent optic nerve
  - Sometimes is related to Central Nervous System dysfunction
  - Can have similar presentation to Autism

Other vision impairments

- Septo-Optic Dysplasia
  - Underdevelopment of optic nerve/disc
  - Abnormal midline brain structures and pituitary hypoplasia
- Cortical Visual Impairment (CVI)
  - Brain-based visual disorder
  - Characteristics of color, attention to movement, trouble with complexity, trouble with visual novelty, absence of visually directed reach

The brain becomes stronger with use

- The brain develops and changes through use.
- The only way to strengthen the brain is to use that part of the brain.
- How do we use our brain?
  - Play
  - Practice
  - Problem solving
  - Experience
  - Trial and Error
  - ACTIVE PARTICIPATION

Photo of sensory input and motor output

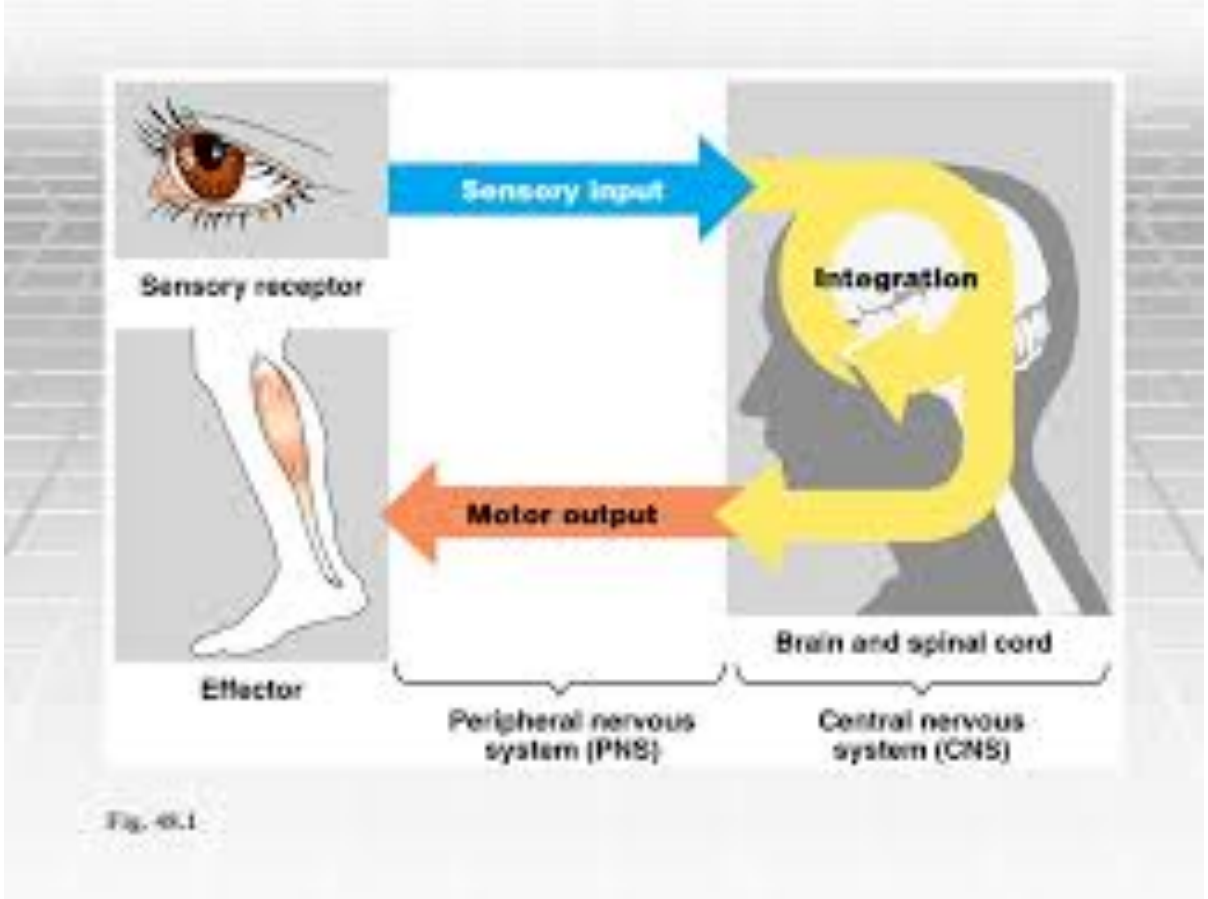
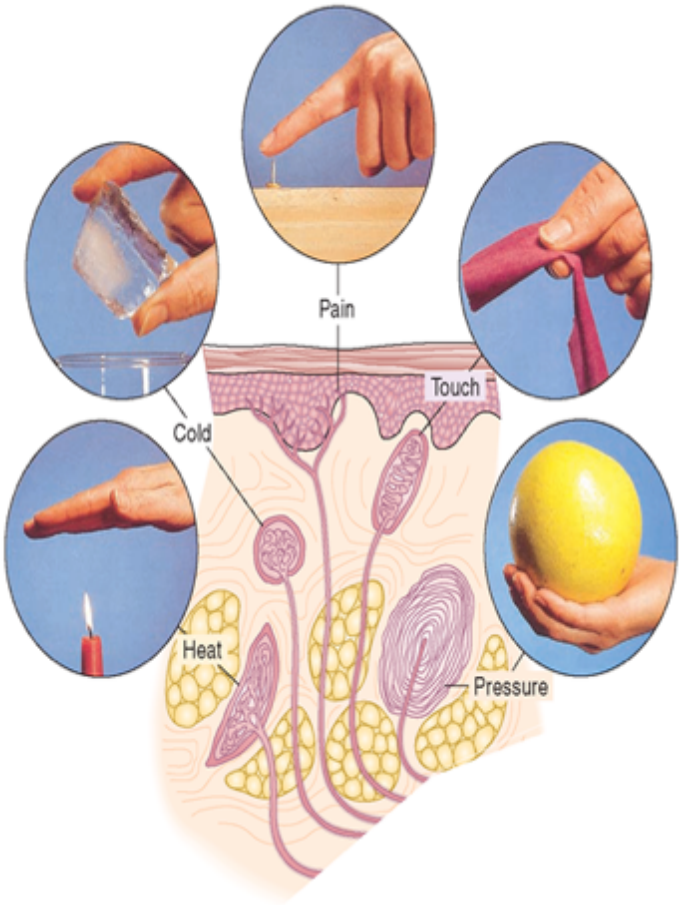
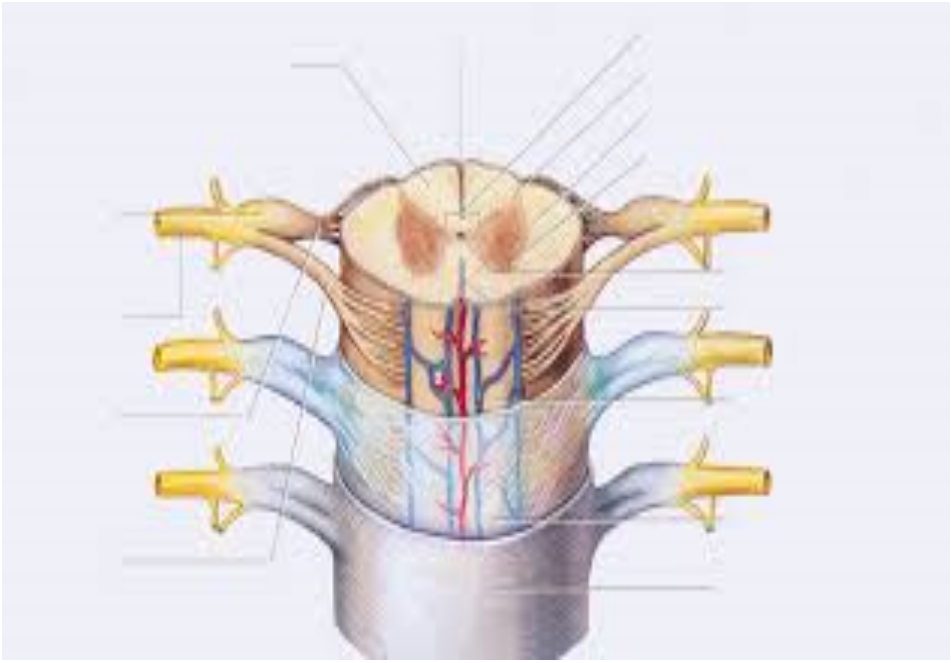
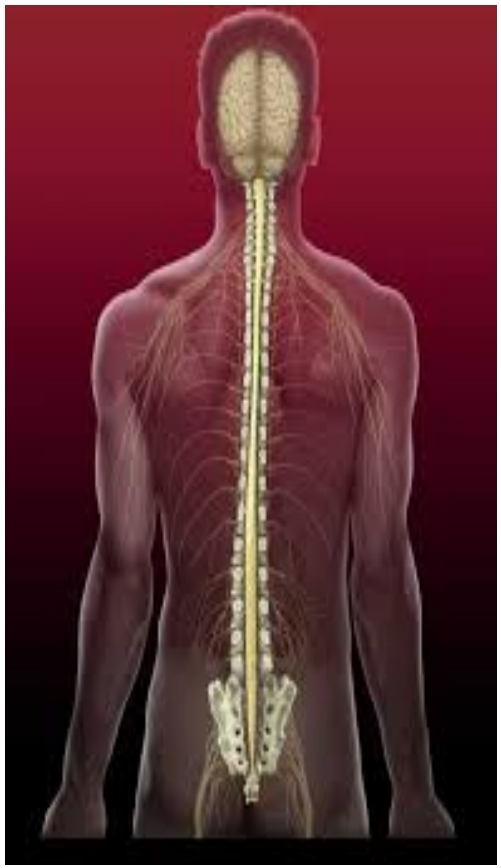


Photo: Sensory Information goes to the Brain through the Spinal Cord



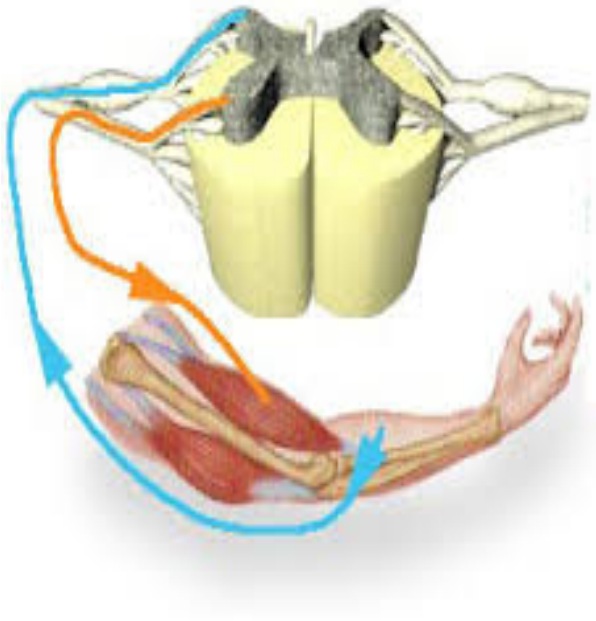


The Spinal Cord



- Nerves travel from the brain down the spinal cord to the muscles and tell the muscles how to move.
- Information about sensation travels from the body and into the brain.

The brain constantly uses this sensory information to improve the accuracy of movements



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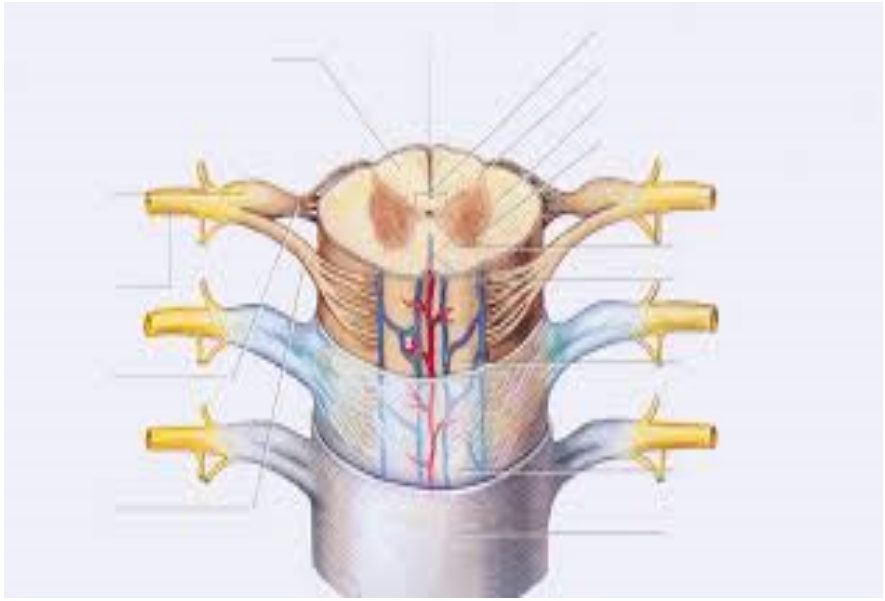

What is gross motor development

- The ability to use large (core stabilizing) muscles of the body to perform whole body movements:
  - Sitting
  - Standing
  - Crawling
  - Running
  - Jumping
- Body-eye coordination skills
  - Catching and throwing a ball
  - Kicking a ball

Posture and Balance: Why is it important?

- It is the foundation for all other skills:
- You can't get dressed if you can't maintain standing on one leg
- You can't write your name if you are falling over in your chair.

Vision's influence on gross motor development

- Social awareness
- Imitation
- Visually guided reach
- Motivation to move
- Feedback on successful movement
- Body often follows the head and eyes

Infant

- Cries
- Smiles
- Turns head
- Looks and follows people or objects
- Hands are open

Three months of age

- Starts to lift their head against gravity on belly and laying on their back
- Start to push into the surface they are laying on
- Start reaching and grasping
- Develops eye contact, smell, sounds
- Touch is very important
- Starts to tolerate different physical positions

Photos of 3 month old babies

Six months of age

- Sitting begins
- Weight bearing and weight shifting
- Gains strength in torso
- Learn about the world through exploration
- Uses hands together
- Reaching and grasping
- They like to move a lot

One year of age

- Able to use their arms to catch themselves when they lose balance
- Able to change between positions
- Able to pull into stand and start walking
- Starts building and stacking rings
- Starts holding a cup and spoon

Development of walking

- Ability to stand and be stable
- Ability to move and be dynamic

Delay of postural development in individual with vision impairment

Accompanying Traits

- Late development of head control
- Head down posture
- Dragging feet when walking
- Walking with feet wide apart
- Self-provided vestibular input

Contributing factors

- Delayed neck and posture muscle strength
- Front neck muscles get tight, back muscles get "overstretched"
- More motivated by what is touching them than what is not touching them
- Not aware of social cues, lack of imitation

What can we change?

- **the individual**
- **the task**
- **the environment**

Improving posture

- Prevention of tight/loose muscles
- - neck, trunk, hips
- - spent time in different postures, not just sitting
- Prevent postural fatigue
- Change position every 30 minutes
- Good seating: feet on floor, arm rests
- Head switch

- Encourage reaching over head
- Reinforcement and verbal/tactile reminders
- Orientation
- Reaching for things that are in a set location
- Decrease visual and auditory clutter
- Give sensory breaks

Photo of an individual slumped over in his wheelchair: How would you help?

What is Balance?

The 3 Sensory Systems for Balance

- Vision
- Proprioception
- Vestibular

- To maintain vertical orientation:
  - Gravity (vestibular)
  - Relationship between body segments (proprioception)
  - Support surface (proprioception)
  - Environment (vision)

Examples of balance

- Change in your base of support
- Reaching outside of your base of support
- Turning your head while standing still or walking
- Tripping and catching your fall
- Pushing open a door
- Walking down stairs

Who is the individual with a balance problem?

- The child who prefers to lay on the ground
- The individual who gets very nervous when they are not touching a stable surface
- The individual who does not like to stand on a soft or unsteady surface
- The individual who gets overwhelmed in a busy environment

Can one sensory system compensate for another missing or damaged sensory system?

- The balance problem might be because of something that you can see
  - A movement problem
  - A vision problem

- The balance problem might be because of something that you can not see
  - A lack of sensory information (vision, somatosensory, vestibular)
  - An inability to process all that information

Balance

Reactive

- The ability to protect yourself when you might fall over
  - Ankle
  - Hip
  - Stepping strategy

Anticipatory

- The ability to set your body up so that you can do an activity without falling over
  - Reaching for a toy
  - Pushing open a door
  - Doing desk work

Teaching principles

- You must keep the individual safe
- Set up opportunities that are motivating
- Allow the child to explore
- Use your hands as little as possible. Guard the child, but try not to hold onto them unless it is necessary.
- Allow the child to fall only if it is safe. This will help the child learn what is safe. This will help the child learn to protect themselves.

Teaching ideas

- Use other sensory systems (sound or touch) for reaching and other dynamic activities
  - Sounds (balls with bells)
  - Vibration
  - Switches
  - Tactile objects

- Make it fun (stimulate other sensory systems)
  - Roller-skating/Ice skating/Snow shoes
  - Swings
  - Ball pit
  - Pool
  - Scooter
  - Horse back riding

More teaching ideas

- Yoga
- Bean bag on my head
- Jumping
- Tug of War
- Crawling through tunnel
- Running, walking, jumping along a trailing board or rope
- Wheelbarrow walking
- Kick the Carton (with sound inside)
- Walking or dancing steps to music
- Throwing, catching, rolling something with bells inside

Photo: Introduction to the Tilt Balance Board

Photo: Tilt Board - Take 2

Photo: Tilt Board - Take 3

Photo of a student roller skating

Photo of a student walking in “moon shoes”

Photo for a girl walking on the balance beam

Photo of girl lying on her side to help focus her vision

Photo of girl doing squats against wall

Photo of a girl doing a puzzle in kneeling

Photo of yoga class

References

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