

Strategies to Support Children with Down syndrome in the Classroom

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Occupational Therapy

Enable children to engage in & perform the **occupations** that are important & meaningful to them

- **Occupations:** activities that a child **wants & needs** to do within their day

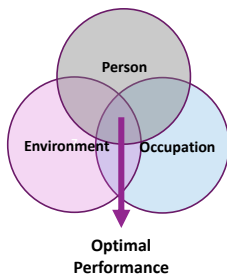
Develop a child's independence in the areas of:

- **Self-care** – toileting, dressing, hygiene, eating
- **Productivity** – academic tasks at school, employment
- **Leisure** – participation in recreational or social activities, hobbies

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Occupational Therapy

Optimal Performance



Optimal Performance occurs when:

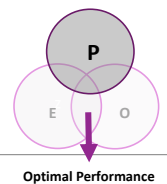
- A child is motivated to perform a task
- The task demands are at the '**just right challenge**'
- The environment is adapted to facilitate success

A child performs at their best when there is a balance between:

- **Person**
 - Internal factors & motivation
- **Occupation**
 - The task & it's demands
- **Environment**
 - External factors in the environment

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Person Factors



Motivation & interests

- Preferred toys & favourite activities

Cognitive skills

- Difficulty taking in, organizing & remembering information
- Difficulty with planning, reasoning & problem solving

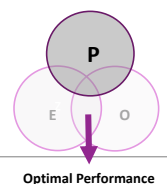
Learning style

- Visual memory is stronger than auditory memory
- Preference for repetition & sameness



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Person Factors



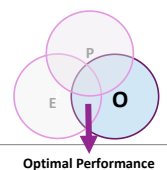
Physical factors of children with DS

- Hypotonia
- Decreased strength
- Short limbs
- Hypermobility
- Sensory processing challenges
- Medical conditions



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Occupation Factors



The task & it's demands

What is involved in the task?

- What are the steps of this task?
- What are the skills that are necessary to complete this task?

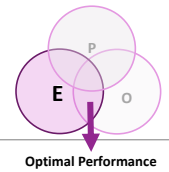


What are the child's skills?

- What tasks can they do?
- How can we adapt this to be *the just right challenge?*

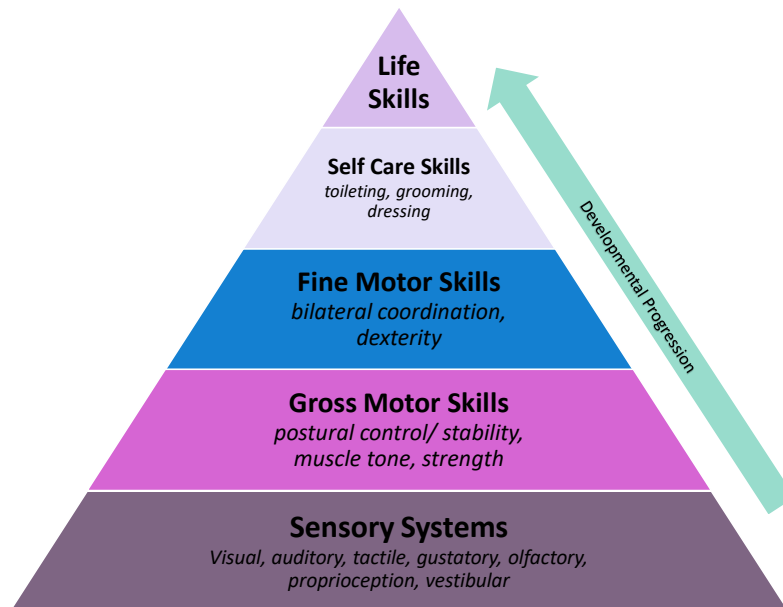
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Environment Factors

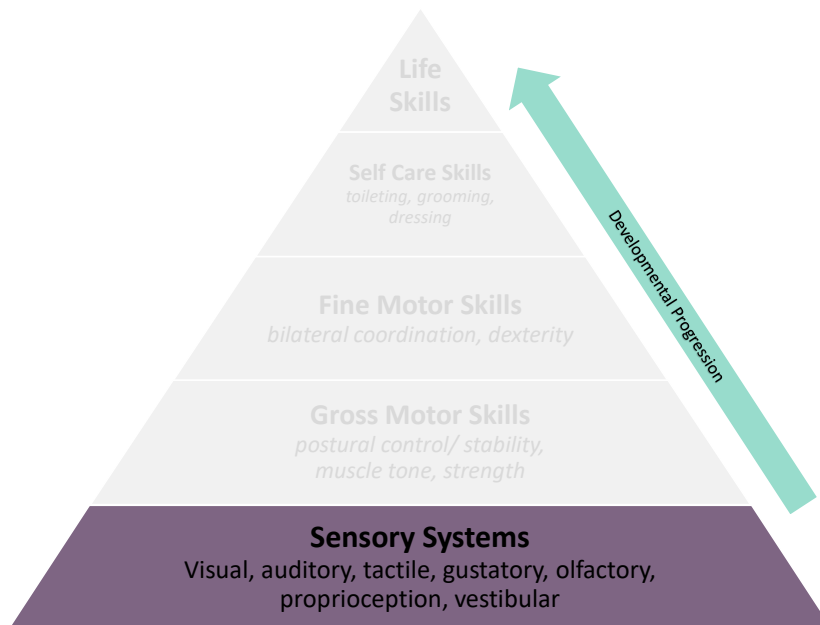


- Important to determine the environmental factors that may be impeding learning & engagement in a specific setting
- The physical environment, along with the availability of supports, have an impact on the child's optimal performance in a setting
- **Adapt** the environment to suit the needs of the child

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SENSORY PROCESSING

Ability to take in, organize & make sense of the sensory information received by the brain from the sensory systems, & respond appropriately



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Sensory Processing Challenges

- Research suggests that approximately **49%** of individuals with DS experience sensory processing challenges compared to approx. **5 - 16%** of the general population
- Children with DS can experience differences in the way they process & respond to sensory information

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Sensory Systems

Visual (*sight*)

Auditory (*sound*)

Tactile (*touch*)

Gustatory (*taste*)

Olfactory (*smell*)

Proprioception (*body awareness*): tells us where our bodies are in space & how different muscles & joints are moving

Vestibular (*movement*): maintain our balance and posture & understand where & how fast our bodies are moving

** **Interoception**: sensations that are registered by our internal organs such as hunger, thirst, pain, temperature and bladder/bowel fullness



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Importance of Sensory Processing

Children with sensory processing challenges may experience:

- Reduced participation in activities of daily living
- Impaired self-esteem & increased levels of anxiety
- Increased levels of frustration
- Difficulties with *self-regulation*
- Reduced participation in sensory experiences can limit a child's learning opportunities – children learn about their world through active exploration & experimentation with their environments



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Sensitivity vs Seeking




Sensory Sensitivity Children can be <i>over</i> sensitive to specific sensory input	Sensory Seeking Children are <i>under</i> sensitive to specific sensory input
Children may be <i>fearful</i> or <i>avoid</i> certain sensations <i>E.g. Unexpected loud noises – School announcements/School bell</i>	Children <i>seek</i> out greater than average amounts of sensory input (<i>more intense</i>) <i>E.g. Intentionally falling or bumping into objects</i>

Children can fall into either categories for each of the sensory systems

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Sensory Sensitivities

Common sensory processing difficulties in DS:

-  **Visual** – dislike bright lights, overwhelmed or distracted by too much visual information
-  **Auditory** – react strongly to unexpected or loud noises, or distracted by background noises
-  **Tactile** – dislike messy play or touching certain textures, or tags in clothing can be uncomfortable

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Sensory Seeking

- 
Proprioception (*body awareness*) – Enjoys jumping & crashing, bumping into others, enjoys being squeezed/squished
- 
Vestibular (*movement*) – needs to move constantly, can't sit still, rocks or fidgets in chair
- 
Tactile – seeks out opportunities to feel textures on hands/feet or other body parts
- 
Visual - takes more visual information to react, seeks bright environments, reflective flashing or spinning lights & objects

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Sensory Strategies

- Adapt the environment to manage *sensory sensitivities*
- Incorporate *sensory seeking* needs into safe & fun activities that provide the desired intensity of the sensory input
 - Create more **functional** & appropriate ways to allow for *sensory seeking* behaviors in the classroom



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Sensory Strategies (Visual Sensitivities)

Decrease visual input & minimize visual clutter:

- Position child close to the teacher & at the front of the classroom
- Ensure classroom desks are clean & clear; with only the necessary materials
- Define visual space & keep it consistent
E.g. same desk
- Use a *study carrel* or a *folding privacy screen*



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Sensory Strategies (Visual Sensitivities)

Techniques

- Add cabinets with doors
- Add simple shelves with uniform bins
- Cover materials with solid curtains
- Use solid rugs
- Decrease patterns & pictures on the walls & ceiling



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Sensory Strategies (Visual Sensitivities)

Consider lighting in the classroom

- Seat child away from the window
- Cover florescent classroom lights with a **light filter** or use **dim light bulbs**
- Provide child **tinted glasses** or **sunglasses**
- Paint classroom walls/ceilings cool, calm colors



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Sensory Strategies (Visual Seeking)

Build toys that provide visual input into **functional play activities**:

- Bubbles
- Lava lamps
- Glitter wands
- Strobe lights
- Bright flashing toys
- Spin tops
- Kaleidoscope
- Pinwheels
- Balloons



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Sensory Strategies (Audio Sensitivities)

Remove sources of *unpredictable noise* in the classroom

- Seat child close to the teacher & away from door/hallway
- Provide **noise canceling head phones, ear buds or ear plugs**
- Provide access to a space for a *quiet retreat* if child shows signs of becoming over aroused
- Quiet retreat – sensory calming items (**bean bag chair, pillows, stuffed animals, books**)



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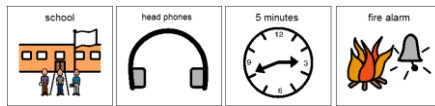
Sensory Strategies (Audio Sensitivities)

Provide child with warning when there will be increased noise

E.g. Fire alarm

- Warn child prior to entering a noisy environments & slowly encourage participation in such environments

Visual schedules



Visual timers



Useful for providing predictability & to decrease anxiety

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Sensory Strategies (Tactile Sensitivities)

Encourage exploration of new textures at child's own pace

- **Tactile bins** – cornmeal, oatmeal, water, sand, lentils
- **Treasure hunt** – hide small objects in Play-Doh or tactile bins
- **Draw/print** – in finger paint, foam soap or shaving cream
- **Feelie bag/book** – different textures



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Sensory Strategies (Tactile Seeking)

Incorporate fidget toys that provide tactile input into **functional play activities**:

- Silly putty
- Stress balls
- Soft/squishy/stretchy toys
- Slinkys
- Fidget for your digit
- Pencil fidgets



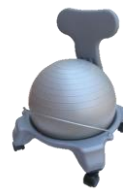
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Sensory Strategies (Proprioceptive / Vestibular Seeking)

Sensory break activities can be incorporated into child's school day to provide required sensory input

These can be completed prior to higher demanding tasks & spread out throughout the entire day



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Sensory Strategies (Proprioceptive / Vestibular Seeking)



INDOORS

- **Scooter board** - pushing with arms/legs
- **Therapy ball** activities – bounding up/down in seated position
- Carry a heavy **back pack**
- Jumping on a **trampoline**
- **Rocking chair**



OUTDOORS

- Hang from **monkey bars**
- Climb on **playground equipment**
- **Throw/kick** or push large exercise ball

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Sensory Equipment (Movement)

- Trampoline
- Scooter board
- Exercise ball
- Heavy backpack
- Theraband



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Sensory Equipment (Seating)

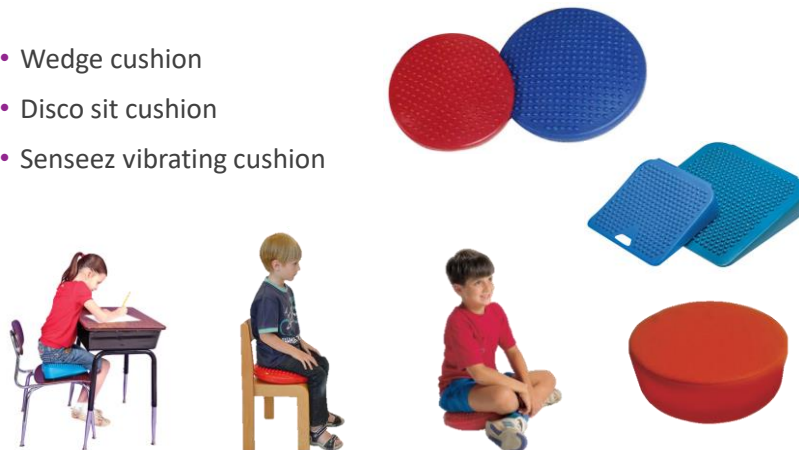
- T-stool or NeoRok Stool
- Peanut ball
- Ball chair
- Rocking chair
- HowdaHUG chair



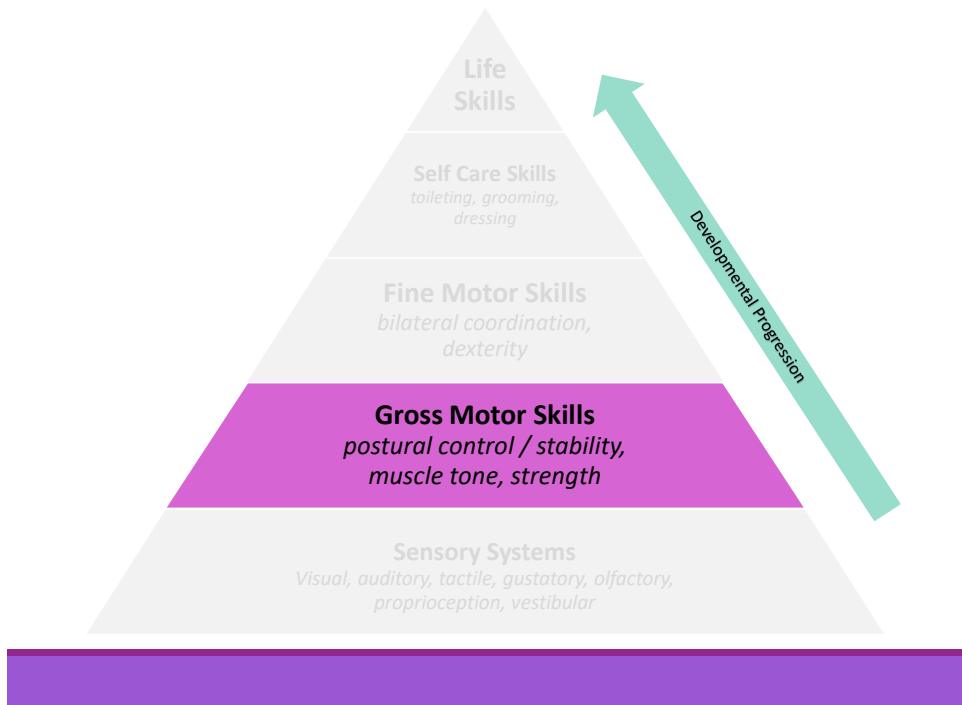
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Sensory Equipment (Cushions)

- Wedge cushion
- Disco sit cushion
- Senseez vibrating cushion



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Gross Motor Development

Foundations for gross motor development

- Muscle tone
- Strength (*upper limbs, trunk, arms*)
- Postural control & Stability

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Muscle Tone

Children with DS exhibit **low muscle tone**, where muscles have less tension & feel “floppy”

- Muscle **tone** is what enables us to keep our bodies in a certain position
- A child with **low muscle tone** may need to exert more effort when doing an activity to activate their muscles
- As a result may have difficulty maintaining their **postural stability** & may fatigue more quickly due to the extra effort required



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Muscle Strength

Children with **low muscle tone** often display:

- Decreased muscle strength
- Decreased activity tolerance & endurance
- Rounded shoulder posture

All these physical factors contribute to reduced ability to sustain a **proper posture** to meet the demands of an activity

A **stable** base of support is necessary to facilitate hand function for fine motor tasks

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Postural Support & Stability

Important to provide proper postural support while seated due to child's low tone & hypermobility

A stable **base of support** is necessary to facilitate hand function for fine motor tasks

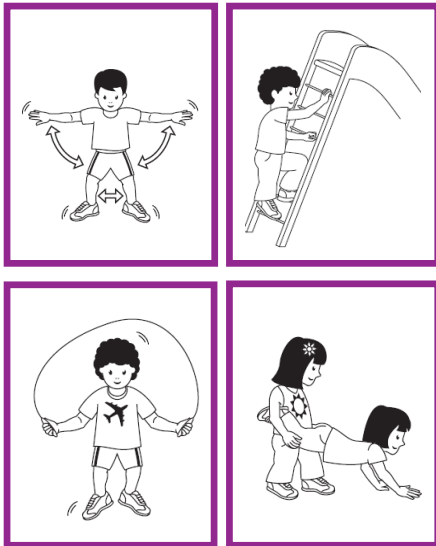
- Stability begins at the trunk progressing to *elbow → wrist → hand*

Supportive seating - Supporting an upright posture may improve muscle tone

- Pressure distribution
- Decreases fatigue & strain
- Decrease tendency to 'lock' joints



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Gross Motor Activities

Increase **muscle tone**

- 10 star jumps
- Jumping jacks
- Running on the spot
- Stomping, jumping rope
- Ball games – catching, throwing, bouncing

Improve **strength & postural control**

- Animal walks
- Wheelbarrow / Scooter board races
- Playground equipment – climbing, swings, monkey bars
- Yoga

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Positioning

Floor time / Circle time

Avoid 'W' sit – this doesn't engage the core

- Does not allow for development of strong trunk muscles
- Strain on hips & knees
- Restricted movement at the hips
- Inability to rotate upper body
- Difficult to reach across the body
- Difficult to shift weight

Different seating options (*carpet circles, disco sit, supportive seat*)

Alternate Postures



'Criss-Cross Apple Sauce'



Long Sitting



One leg bent

Sitting against a wall can provide more support

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Floor & Circle Time Seating



Howda HUG Chair



Disc-O-Sit



Carpet Circles



Bean bag chair

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Positioning

Proper Chair Size

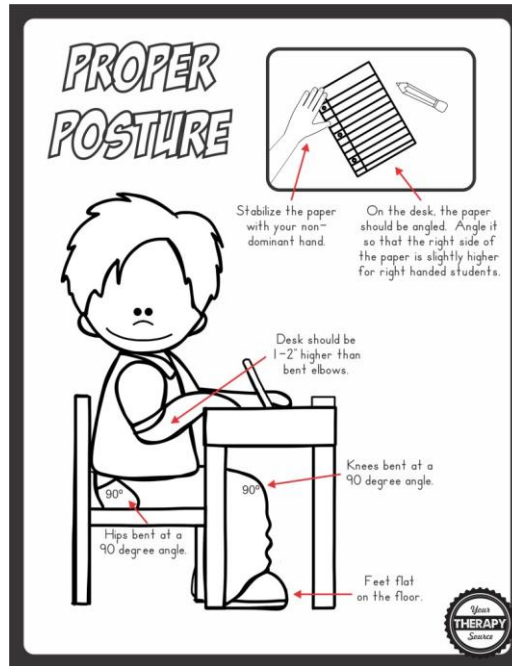
- Feet flat on floor
- Ankles, knees, hips bent at 90 degrees

Proper Chair Position

- Seated comfortably, bend forward at the waist leaving a small space
- Arm should be 30 degrees angle from the body

Proper Desk Size

- The height of the top of the desk should be approx. 90 degrees
- Arms rest comfortably on desk top
- Clearance for knees, thighs/feet



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Increasing Muscle Tone

Warm up activities / stretches

- Yoga, animal walks
- Therapy ball exercises
- Chair push ups, jumping jacks, cleaning chalkboard

Frequent breaks – prevent fatigue

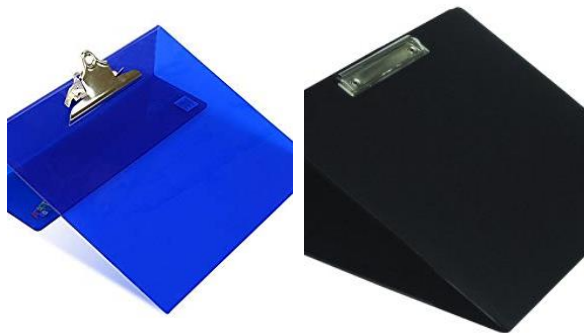
- Stand up and stretch / March in place
- Music / dance / singing breaks
- Play Simon Says

Exercise

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Positioning Equipment

- Stool
- Adjustable desks
- Adjustable chairs
 - Supportive Cushions
 - Supportive Wedge
- Easels or slant boards



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Stools



Jett Step Small Wooden Footrest



Collapsible Foot Stool

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Adjustable Desks



Classroom Select Classic Study Top Desk



Adjustable Height Folding Table



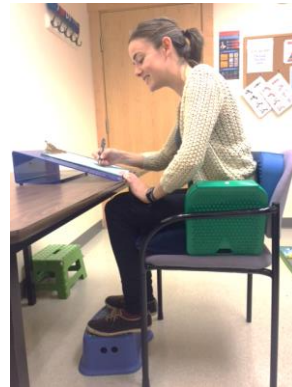
Classic Square Table

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Chairs



Classic Birch Transition Chairs

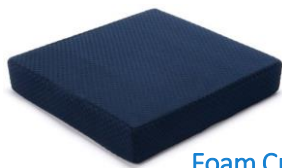


Adapted Setup

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Cushions & Wedges

Position wedges/cushions



Foam Cushions



Foam Wedges

Howda HUG Chair



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Easels & Slant Boards

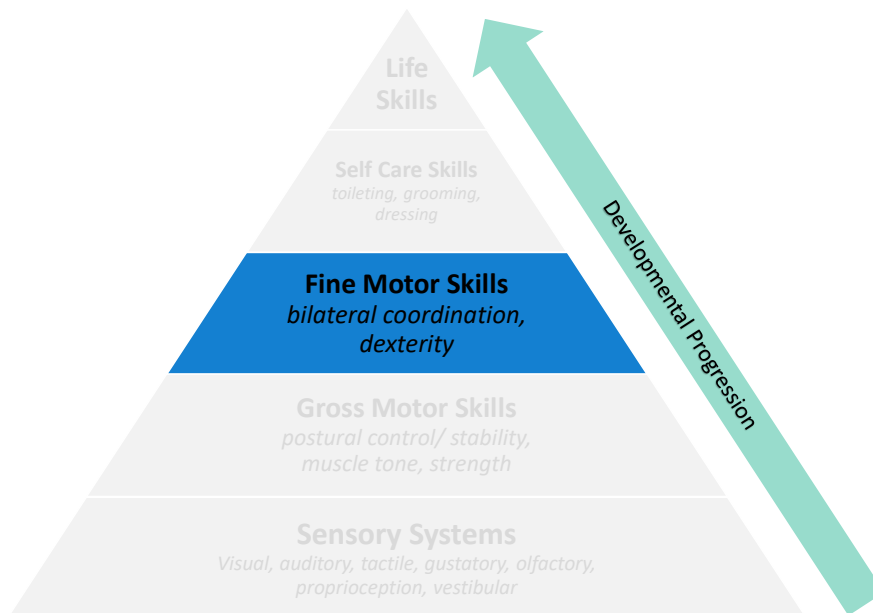


Slant Script Board



Double Adjustable Easel

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Fine Motor Development

Performing functional tasks through small movements of the hands, wrists & fingers

- Drawing & Printing
- Cutting
- Fasteners (*buttons and/or zippers etc.*)
- Eating with utensils



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Fine Motor Development

- Foundational skills are important for FM development
- Children build on previously learned skills as they progress towards more complicated tasks
- Children will best learn skills through meaningful activities

Building blocks of optimal fine motor development:

- **Tactile perception**
- **Postural control**
- **Bilateral coordination**
- **Dexterity**

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Tactile Perception

- **Tactile perception** involves sensory receptors sending information to the brain about what the fingers and hands are touching.
- Touch sensation enables us to feel things, and to understand what we feel making it an important component for developing FM skills
- Helps the child learn to guide their finger movements so that fine motor skills can be more automatic

Difficulties with tactile perception:

- Appear clumsy and drop objects
- Hold pencils very tightly
- Issues with pencil pressure

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Develop Tactile Perception

Providing children with a variety of sensory experiences where they can feel and do with their hands

- Better able to anticipate, discriminate and adjust their hand and arm muscles in response to sensory input

Activities can include:

- Hand and finger massages prior to fine motor activities
- *Tactile adventure bins* – sand, cornmeal, lentils
- *Treasure hunt* – hide small objects in playdoh
- *Finger painting* – paint, foam soap, shaving cream

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Postural Control

Ability to stabilize the body by integrating sensory input about body position with the motor output to coordinate the action of the body's muscles

Important for:

1. Effective writing, drawing and cutting skills
2. Sit up in a chair without slouching
3. Sit cross-legged on the floor
4. Using the right amount of pencil pressure and pressing down on the paper

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Bilateral Coordination

Use of both sides of the body together in a coordinated manner to perform a functional task

Developmental Progression

Gross symmetric bilateral skills

- *Holding objects with 2 hands, clapping ,banging objects together*

Stabilize object with one hand while manipulating with other

- *Holding a container while putting an object in it*

Complementary two hand use

- *Manipulating objects with both hands simultaneously*

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Development Of Bilateral Coordination

Gross symmetric bilateral skills

- Playing with toy instruments; banging drums, triangle, cymbals
- Playing catch / throw games to encourage coordinating both hands

Stabilize object with one hand while manipulating with other

- Stringing uncooked pasta on yarn or beads on pipe cleaners/ string

Complementary two hand use

- Pinching, pulling, squeezing, play-doh (*finding hidden objects, etc.*); as well as using the play-doh "tools"
- Snipping/ cutting with scissors- yarn, string licorice, play-doh, construction paper (*thicker*), coupons, etc.

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Dexterity

Skillful, precise and efficient hand movements

- Grasp
(*pencil, utensil use etc.*)
- Finger Control and Coordination
- Hand and wrist movements

Importance of dexterity

Accomplish functional tasks such as dressing, feeding, and school related Activities (*printing, coloring, cutting*)

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Developing Dexterity



Puzzles



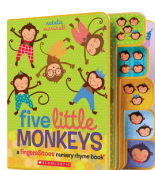
Wind Up Toys



Toys with buttons / switches



*Play Doh
Embedded beads/marbles*



Finger Rhymes



Action Songs

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Fine Motor Skills

Pencil Grasp / Dominance

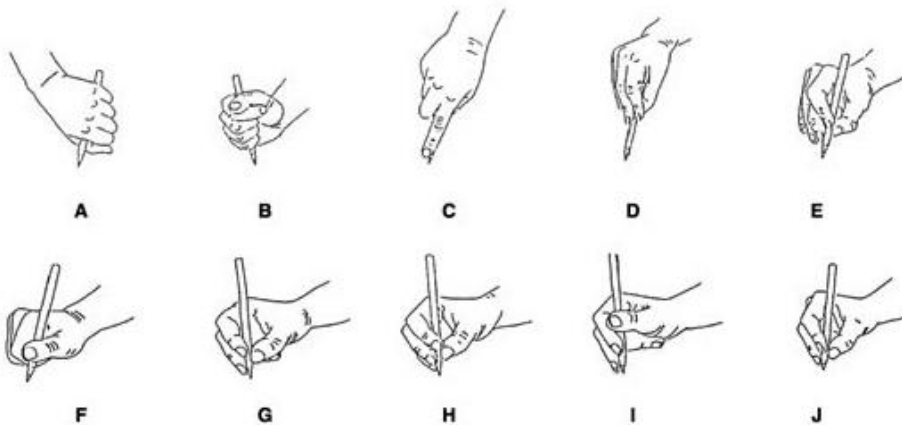
Pre-printing Skills

Printing Skills

Drawing & Coloring

Cutting Skills

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Grasp Development

Development of functional tripod grasp

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Developing Tripod Grasp

- Play with puzzles that have pegs for the children to grasp
- Build with Legos
- Playing games like *Operation* with tweezers to manipulate items
- Crafts
 - Tearing paper to make a collage
- Squirt toys



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Hand Dominance

- Refers to the consistent favouring of one hand over the other for the skilled part of an activity
- Typically begins to emerge in pre-school years and established by Kindergarten

What is Crossing Midline?

- One hand spontaneously moves over to the opposite side of the body
- Before this develops, children use the left hand on the left side of the body and the right hand on the right side of the body
- Crossing the midline needs to be established so the dominant hand receives the practice it needs to become skilled



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Development Of Hand Dominance



Adapt the environment to facilitate crossing the midline of the body:

For example

1. Wiping down large tables
2. Draw/trace large Figure 8's
3. Ball Passing games
4. Worksheets or drawings

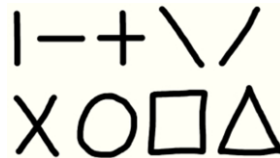
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Pre-Printing Development

Children begin experimenting with colors and strokes on paper – working on directing their hands

Developmental Sequence

- *Scribbling* & random marks on paper
- *Separate strokes: vertical, horizontal lines*
- *Diagonal lines: X and +*
- *Simple shapes: square, triangle*
- *First letters: capital letters of name*



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Printing – Teaching Sequence



1

Tracing



2

Imitating



3

Copying



4

Printing Independently

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Fine Motor Warm Ups

Activities to increase *muscle tone*

Shoulder warm ups:

- *Chair or desk push ups*
- *Shoulder shrugs*

Arm and hand warm ups:

- *Playdough, plasticine or theraputty – roll, pinch, squeeze, pound and make sausages, balls and pinch*
- *Spray bottles – water plants or make pictures by squirting water on the concrete*
- *Dig a small patch in the garden*



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Printing Strategies

Handwriting Without Tears

- Build letters
 - Wooden letter pieces
 - Roll a dough letters (Playdoh)
- Stamp and see screen
- Big line, little lines, big curve, little curve



Wet dry try

- Slate chalk board
- Sponge cubes
- Little chalk pieces



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Drawing Development

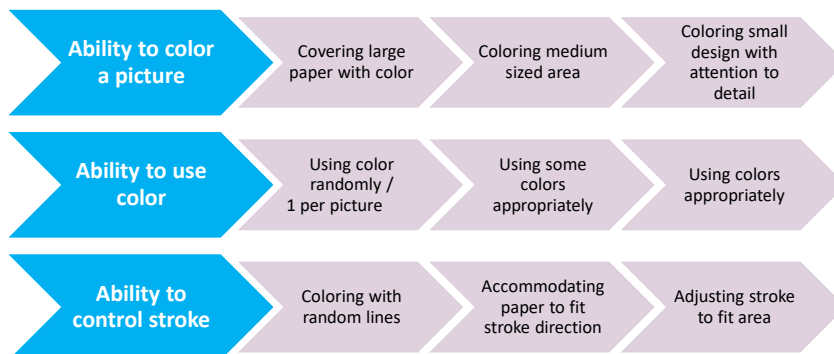
Developmental progression in **drawing**

- Scribbles, traces of movement, and linear strokes
 - 1. Intentional figures**
Generic circle for face; lines for arms & legs
 - 2. Recognizable figures**
More parts, accuracy in placing parts, may resemble subject
 - 3. Figure in Scene**
Dimensional figure with familiar objects



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Coloring Development



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Developing Drawing & Coloring

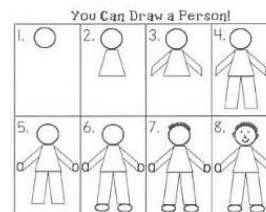
Drawing

- Introduce shapes and strokes in developmental order
- Build Mat man (*HWT*)
- Sing along CD (*HWT*)
- Step by step drawing



Coloring

- Use *wiki stix* or *bold outlines* to teach coloring inside the lines
- Provide coloring opportunities in different mediums
 - Paints, pencil crayons, markers, colored chalk
 - Large barrel crayons / markers for smaller hands
- Use vertical surfaces
 - Slant boards, easels or taping a picture to a wall



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Adaptive Equipment

Printing, Coloring, Drawing



Pencil grips

Slant Board



Triangle Pencils



Twist n' Write Pencils



Wikki Stix



Easel

iPad Stylus



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Cutting Development

Developmental sequence

Interest
 Holding
 Opening & Closing
 Snipping
 Cutting Forward
 Cutting a Line
 Cutting Straight-Edged Shapes
 Cutting Rounded Shapes
 Cutting Complex Designs
 Cutting Other Materials



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Develop Cutting Skills



Fine Motor Games



Squeeze Games



Tweezer games



Ripping Paper

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Adapted Equipment

Choice of Scissors

- For small hands use scissors that don't require a lot of movement to open/close
- Metal blades work better than plastic (*with rounded tips for safety*)

Paper

- Paper with slightly heavier weight and stiffness is easier to cut when in the learning stage



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Learning Strategies

- Motivation
- Visuals
- Task Analysis
- Grading
- Backwards Chaining

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Learning Strategies

Motivation

- Provide social praise, reinforcements & rewards
 - Preferred toys
 - Favourite activities
- Make it fun!
- Children learn best through play
- Incorporate preferences



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Learning Strategies

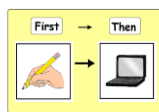
Create routines & use repetition to teach new tasks

Children with DS are **visual learners**

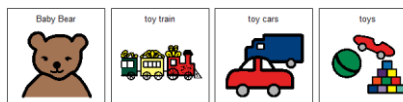
- Use visual schedules



- First → Then visuals



- Visual choice boards



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Teaching Skills – Task Analysis

Task analysis is the process of breaking a skill down into smaller, more manageable components

Step By Step

1. Break down the task into small steps
2. Determine which step the child is having trouble with and begin support there
3. Use sufficient supports at first, then slowly fade to promote independence (*maximal to minimal support*)

Grading

1. Progressively increasing or decreasing the difficulty, duration or frequency of a task/activity



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Task Analysis Handwriting

Steps

1. Sitting at a table / desk
2. Holding pencil in one hand
3. Stabilizing paper with helper hand

Skills needed

1. Maintain proper posture at table or at a desk
2. Use hands in coordinated manner
3. Manipulate writing tool
4. Hand & finger strength
5. Visual motor skills

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Task Analysis - Handwriting

Child's skills

- Ability to attend to the task
- Ability to maintain their posture & hold a writing tool
- Functional pencil grasp for printing

Adapt Task

- Providing the *'Just Right Challenge'*



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Task Analysis - Example

Putting on a jacket

1. Orient the jacket
2. Put right arm in
3. Put left arm in
4. Pull to shoulders
5. Grasp zipper
6. Hook zipper
7. Grasp jacket
8. Zip up zipper



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Teaching Skills - *Backwards Chaining*

Breaking down the steps of a task and teaching them in **reverse order** – motivates and facilitates success

Putting on Jacket

1. Orient the jacket
2. Put right arm in
3. Put left arm in
4. Pull to shoulders
5. Grasp zipper
6. Hook zipper
7. Grasp jacket
8. Zip up zipper

Help kids perform steps 1-7 and then let them complete the task by performing step 8

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When to Consult an OT?

A few signs that a child may benefit from OT:

- Hesitates to climb on playground equipment
- Difficulty learning a new motor task or appears clumsy
- Dislikes or has difficulty completing puzzles
- Has difficulty with small manipulative toys
- Difficulty cutting with scissors, drawing or printing
- No clear hand dominance



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When to Consult an OT?

- Avoids getting hands messy
- Difficulty using a spoon, fork or cup
- Difficulties with toilet training, dressing or grooming tasks
- Does not accept changes in routine
- Overly sensitive or heightened reactivity to any sensory system (sound, touch, or movement)
- Constantly moving, jumping, crashing and bumping into things
- Inability to calm down once upset



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Contact Information

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Equipment Resources

School Specialty Canada

- www.schoolspecialty.ca

Wintergreen Learning Materials

- www.wintergreen.ca

Flaghouse

- www.flaghouse.ca

Odin Books

- www.odin.com

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References

Brack, J.C. (2004). Learn to move, move to learn! Shawnee Mission, Kansas: Asperger Publishing Company.

Brack, J.C. (2009). Learn to move, moving up! Sensorimotor Elementary-School Activity Themes. Shawnee Mission, Kansas: Asperger Publishing Company.

Bruni, M., Cameron, D., Dua, S., & Noy, S. (2010). Reported sensory processing of children with down syndrome. *Physical & Occupational Therapy in Pediatrics, 30*(4), 280-293

Case-Smith, J., Allen, A. S., & Pratt, P. N. (2001). *Occupational therapy for children*. St. Louis: Mosby.

Daunhauer, L. A., & Fidler, D. J. (2011). The down syndrome behavioral phenotype: Implications for practice and research in occupational therapy. *Occupational Therapy in Health Care, 25*(1), 7-25.

Falkirk Council Social Services. *Making sense of sensory behavior: A practical approach at home for parent and carers*. United Kingdom.

Fidler, D. J. (2005). The emerging down syndrome behavioral phenotype in early childhood: Implications for practice. *Infants & Young Children, 18*(2), 86-103.

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References

Kranowitz, C. (1998). *The Out of Sync Child; Recovering and coping with sensory processing disorder*. New York, New York: TarcherPerigee.

Kranowitz, C. (2003). *The Out-of-Sync Child Has Fun: Activities for Kids with Sensory Integration Dysfunction*. New York, New York: TarcherPerigee.

Martin, K., Kaltenmark, T., Lewallen, A., Smith, C., & Yoshida, A. (2007). Clinical characteristics of hypotonia: A survey of pediatric physical and occupational therapists. *Pediatric Physical Therapy : The Official Publication of the Section on Pediatrics of the American Physical Therapy Association*, 19(3), 217-226

O'Donnell, S., Deitz, J., Kartin, D., Nalty, T., & Dawson, G. (2012). Sensory processing, problem behavior, adaptive behavior, and cognition in preschool children with autism spectrum disorders. *The American Journal of Occupational Therapy : Official Publication of the American Occupational Therapy Association*, 66(5), 586.

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References

Royal Children's Hospital of Australia. (2005). *Low Tone*, OT Handouts. Retrieved from: http://www.rch.org.au/ot/information_sheets/Kids_health_information/

Yack, E., Sutton, S., Aquilla, S. (2002). *Building Bridges Through Sensory Integration*. Future Horizons, Inc., Arlington, Texas.

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