

“Getting a Write Start”

Physical aspects of motor control; the interplay between sensorimotor development, biomechanics, strength and coordination necessary to control a pencil

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Some of this content is revised from the work, Neurokinesthetic Approach to Hand Function and Handwriting by Mary Benbow, OTR/L

Sensorimotor and fine motor components influence the most challenging classroom functional skill - handwriting;

SENSORIMOTOR FOUNDATIONS:

1. Proprioceptive and Kinesthetic feedback –tight grip, fatigue, lacks automaticity
2. Bilateral Integration-no use of non-writing hand for stability of paper, reversals, avoids diagonals or crossing of midline
3. Posture and Balance-student slumps against desk and or is propped up by hands, or holds head
4. Shoulder, forearm and wrist stability/mobility-substitutes shoulder for hand motions inefficiently
5. Tactile Facility-often distracted due to aversion to light touch, poor letter legibility, inefficient or ineffective writing pressure seen, awkward grasp to avoid the table surface
6. Motor planning-awkward grasp, resist changes, slow labored writing, reversed work, poor initiation

FINE MOTOR FOUNDATIONS:

Efficient hand function is a balancing of physical components.

Stability of the wrist comes from wrist extensors located opposite and diagonal of the side of the hand which is functioning/doing the work.

Fixed and mobile structures in the hand allow it to rotate around its middle. The longer the finger the stronger the finger.

1. Thumb Development-required for an efficient open web spaced grip, lacks distal manipulative skill
2. Hand Arches-problem gripping writing tools of different shapes, frequent use of adducted thumb using strength to hold which forfeits some control
3. In-hand Manipulation-awkward pencil rotation when erasing, drops pencil frequently or uses two hands inefficiently, hand used as single unit which is energy inefficient
4. Motoric Separation of the hand-immature pencil grip and, lacks isolated mobility on stability, scissor use is all open or all closed, again energy inefficient lacking precision
5. Eye Hand coordination-poor execution of letters, limited legibility and poor attention/control to the use of guide lines
6. Laterality- mixed/inconsistent dominance leads to slower growth in motor control due to less practice

What Can We Do? Important role teacher play

Build strength & endurance/Bilateral motor coordination/Reduce tactile sensitivity:

1. Proximal joint control/shoulder scapula activities

Playground play, climbing, swinging, hanging from the bars, jump rope turning are important not only for building a strong core/postural muscles and the entire shoulder girdle but build hand strength as well. Chair push-ups, table pull-ins and out, table up and downs, and praying hands resistance can all be done easily in class. Activities which apply deep pressure can reduce tactile defensiveness over time.

2. Hand strengthening activities

Tearing paper, playdoh/clay play, Legos, hammering, popping bubble wrap-finger fireworks are samples.

Increase wrist and manual coordination & precision:

1. Elbow the supination activities

Slinkys, balloon play, vertical surface work, wrist weight bearing activities on the floor

2. Hand Arches

Shaking dice, water and sand play, sharing a surprise

3. Separation of the two sides of the hand

Squirreling objects In-hand -coin flips, scissor skills, spray bottle play, Chinese balls or magnetic marble play.

4. Precision isolated finger movements

Stringing beads , Geo boards, pick up sticks, stamping using stamps requiring a 3 jaw chuck position , magnetic marbles, clothespin play, Thera putty, small tongs/strawberry hullers, pickle pickers, zip lock bags with 'zippers', picking up and placing coins into slotted cans, flipping cards quickly to match or sort, breaking pasta and placing in holes in cans, stamp or paint with small sponges, make mosaics with small objects such as beans – can upgrade this activity by having child hold all the beans in their palm –placing them with their thumb and index fingers one at a time.

5. Visual motor coordination

Tracing on lines with different markers/rainbow writing/drawing, tracing with glue sticks on a project, working the simple mazes first with your finger, then the eraser, then in pencil, marker etc., to even cutting on the line.

Use a Kinesthetic approach to teaching handwriting

1. GET READY: the learning setting

- A. Properly fit furniture for all students. Chair height should allow firm contact of the child's heels on the floor which allows even weight shift when writing. Knees and hip should be at 90° with weight evenly distributed.
- B. Desk height should be 2 inches above the writer's and elbow when seated on a properly fitted chair. If the desk is too high the shoulders will be abducted too widely for maximum control and if the desk is too low there's a tendency to want to support the head rather than sit upright which is inefficient and limits adjusting the writing paper.
- C. Every desk should directly face the board when and where letters can be clearly demonstrated by an instructor and seen without positional confusion.

2. GET SET: student preparation to promote learning

- A. Students should be encouraged to sit symmetrically whenever encouraged to write. Children who lack postural sensitivity may be unaware of their poor posture alignment so cues may be necessary by the teacher. Sitting in a comfortable stable posture consistently is critical for learning to write kinesthetically.
- B. Papers should run parallel to the writing arm when hands are relaxed and together in the middle of the desktop.
- C. Upward adjustment of the paper should be taught as writing progresses down the page and the forearm should remain below the writing line at all times.

3. GO: Facilitate efficient use of the body and an efficient PENCIL GRIP:

- A. Activate good mobility on stability – prepare body to do the work – chair push-ups, attend to posture, body stretches to attend to symmetry prior to writing
- B. Facilitate an efficient pencil grip
 - 1. What is seen: fist, radial pronate, thumb wrap/trap, quadrupod, digital brace/vertical grasp with or without hyper-extended thumb to name a few. There is a developmental progression.
 - 2. What is most efficient grasp: mature tripod grasp which requires thumb development, hand arches, in-hand manipulation skills, and motoric separation of the two sides of the hand.
 - 3. Why: anatomy of carpal bones and nerve innervation – Tripod grasps use mobility against a stable base for the most efficient biomechanics.

4. How did facilitate:
 - a. Duck/bird motion
 - b. Hold the tip, then give it a flip
 - c. Hold small objects with the 4th and 5th fingers securing against palm
 - d. Motor skills are developed through REPEATED practice
5. How to unlearn an inefficient grip:
 - a. Teaching the proper grip through direct instruction
 - b. Use a visual model on the student desk for them to imitate
 - c. Use adaptive pencil grips as a reminder to break poor habits as well as protect ligaments of the hand while strength/control are developing
6. Scissor Skills:
 - a. Why are they important? To develop the Opponens muscle, increase the development of the separation of the two sides of the hand, and facilitate visual motor control using this skill of cutting to allow another avenue for hands on learning.
 - b. What should finger placement look like? Ideally the thumb should be placed in one loop and the third, fourth and fifth digits placed in the other hole to utilize anatomical separation of the two side of the hand facilitating control in this separation, with fingers 'just in the loops' for biomechanical advantage. Kids with limited kinesthetic awareness need this pointed out for them. This hand position (Just in the loops) can be facilitated by putting extra tape on the large loop to prevent fingers from going too deeply into the hole.

Kindergarten teachers can have one of the greatest influences on a child's physical readiness to put their thoughts down on paper in the future by understanding how important facilitating the physical development of a child and supporting corrected practice through that important first full year of school. I hope that this information has been helpful to you and I thank you for your dedication to this important work.