Handwriting is key in the development of literacy and reading skills. Writing helps with phonemic awareness, spelling, reading comprehension, memory, and information retention. However, Common Core standards fail to address handwriting. Teachers often feel that there is not enough time in the day to target handwriting due to other demands placed on them by Common Core. Occupational therapists are equipped with the skills needed to not only assist students in developing handwriting skills but also help teachers develop a plan to teach handwriting (Collette et al., 2017).

What Can Teachers Do?

- Schedule a specific time for direct, monitored, handwriting instruction, especially in lower elementary grades K-2
- While students are learning letter identification, also instruct on how to form the letter: appropriate start, size, and shape
- Provide students with visual cues of letter shape and formation (dotted lines to trace, numbers and arrows to show starting and direction)
- Provide practice for retrieving letters from memory:
    - Cover-copy-compare: student looks at a letter, says it out loud, covers it, writes it on their own, then uncovers letter to compare to their own
- Use specific instructional techniques: lessons featuring scaffolding, teacher modeling, students practice, and test for proficiency (Datchuk, 2024)

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Handwriting Curriculums

Learning Without Tears
- Formerly known as Handwriting Without Tears
- Developed by occupational therapist, Jan Olsen
- For ages K-5th
- Multisensory using music, manipulatives, and assessments integrated into lessons
- Tailored for educators, special education teachers, and occupational therapists

https://www.lwtears.com/

Size Matters Handwriting Program
- Developed by occupational therapist, Dr. Beverly Moskowitz
- For preschool, elementary students, and adults
- Evidence based, with a focus on letter size
- Everyone can use the handwriting books and associated materials

https://realotsolutions.com/

Zaner-Bloser Handwriting
- Founded by Charles Paxton Zaner in 1888 who was a calligrapher and teacher of penmanship
- For ages Kindergarten-6th grade
- Website offers on-demand implementation training for educators

https://www.zaner-bloser.com/

First Strokes Multisensory Print Program
- Developed by occupational therapist, Jan McClesky
- Offers curriculums for ages Preschool-teen/adulthood
- Utilizes a multi-sensory approach and interactive activities

https://thehandwritingclinic.com/first-strokes-handwriting-programs/
https://www.teacherspayteachers.com/store/the-fine-motor-store

Sensible Pencil
- Developed by Linda Becht
- Children learn to print uppercase and lowercase letters using eleven basic lines
- Designed to help new writers achieve success quickly

https://www.difflearn.com/product/Sensible_Pencil/handwriting_workbooks

Big Strokes for Little Folks
- Developed by occupational therapist, Bonnie Levine Rubell
- An intensive intervention for children with sensory integration difficulties to aid in the development of legible handwriting

https://www.amazon.com/Strokes-Little-Bonnie-Levine-Rubell/dp/0761643672

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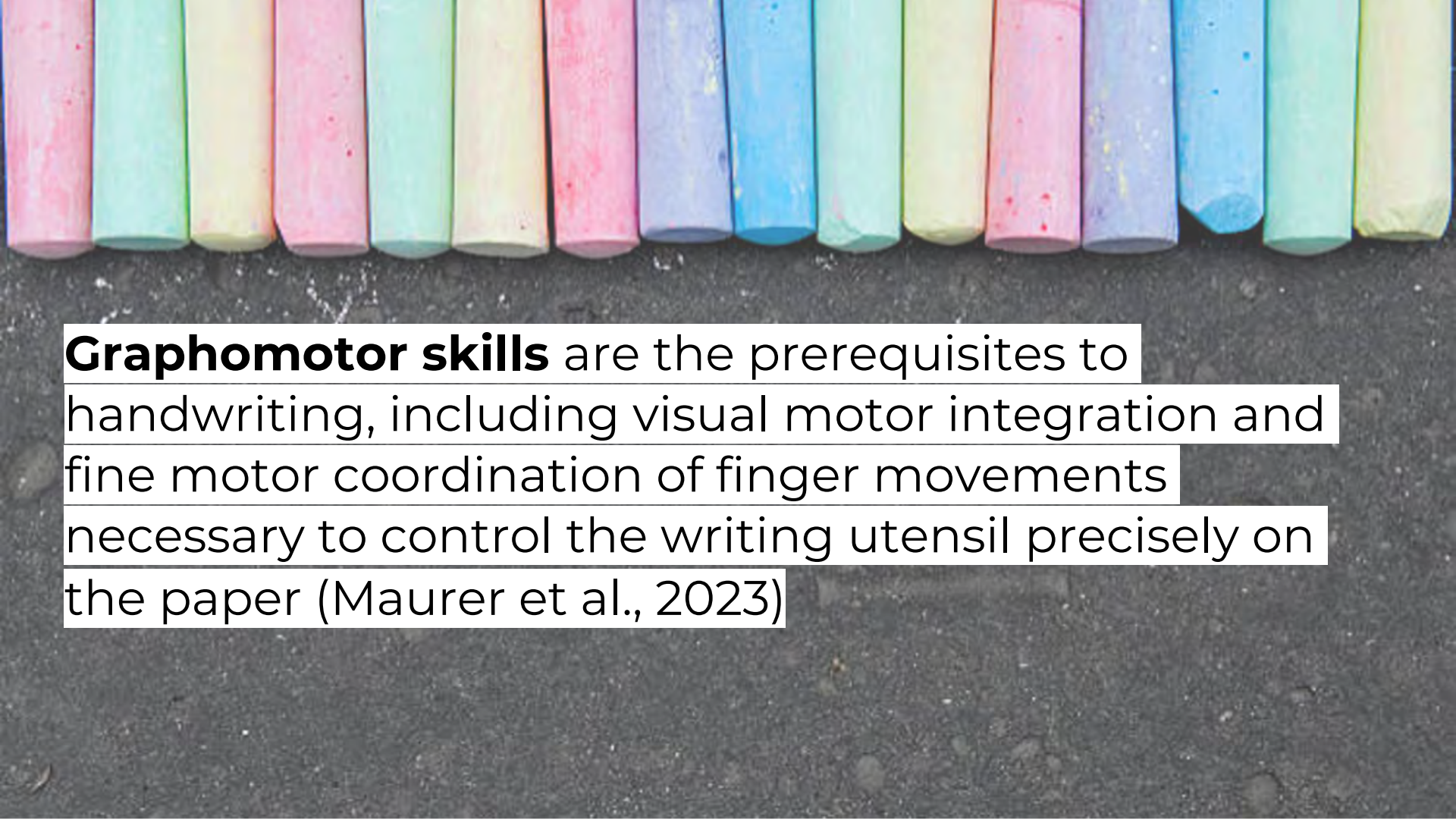
February 14, 2025

An Occupational Therapist's Perspective on Supporting Students' Graphomotor Skills

Alyson Caldwell
MSOT, OTR/L



Graphomotor skills are the prerequisites to handwriting, including visual motor integration and fine motor coordination of finger movements necessary to control the writing utensil precisely on the paper (Maurer et al., 2023)

OTs can practice in countless settings: hospitals, rehab facilities, outpatient settings, mental health settings, in client's homes, etc. OTs in the school system focus on supporting a student's ability to participate successfully in the school environment (Heffron, 2024)

Role of a School-Based Occupational Therapist

According to The AOTA Workgroup of Leaders in State Departments of Education, 2017, “School-based occupational therapy practitioners are occupational therapists (OTs) and occupational therapy assistants (OTAs) who **use meaningful activities (occupations) to help children and youth participate in what they need and/or want to do** in order to promote physical and mental health and well-being. Occupational therapy addresses the physical, cognitive, psychosocial and sensory components of performance.” (para. 1)

School-Based Occupational Therapists Can Address...

Attention Deficit Hyperactivity Disorder (ADHD)

- The DSM-V describes ADHD as a neurodevelopmental condition characterized by symptoms of inattention and/or impulsivity/hyperactivity
- Children with ADHD-combined type display fine and gross motor difficulties that often present as handwriting difficulties (Langmaid, 2012)
- Some studies have suggested that 50-70% of ADHD children demonstrate difficulty with handwriting legibility and speed
- Children with ADHD encounter more handwriting difficulties than non-ADHD children (Puyjarinet et al., 2024)

Developmental Coordination Disorder (DCD)

- Often characterized as “clumsy” or uncoordinated
- According to the DSM-V, a child with DCD exhibits motor coordination performance below his/her developmental age, difficulties with fine or gross motor coordination that interfere with academics and/or activities of daily living, and may have had delays in early motor milestones, such as walking or crawling
- Affects between 5-6% of school-aged children
- DCD can directly impact motor planning, handwriting, and executive functioning (Harris et al., 2015)

Autism Spectrum Disorder (ASD)

- ASD is a neurodevelopmental disorder which includes a wide range of complex developmental and neurobiological disabilities
- The DSM-V lists impaired communication, social interaction, restricted interests, repetitive behavior patterns, and impaired sensory information processing
- As many as 86% of children with diagnosed ASD are referred to therapy services to improve handwriting and fine motor skills (Handle, 2022)
- In a 2022 literature review by Handle et al., it was concluded ASD affects manual dexterity, graphomotor skills, general motor skills, visual motor integration and visual perception

Dyslexia

- A specific learning disorder that affects the decoding skills in reading
- Individuals with dyslexia often have spelling and writing difficulties that can be more severe and persistent than reading problems (Snowling and Hulme, 2011)
- Dyslexia involves difficulties related to phonological processing needed for decoding words, and writing requires the ability to encode phonological information
- Reading is a skill that is required for writing - need to be able to re-read own writing to notice spelling errors, disorganization, and grammatical errors
- Although not always considered, handwriting problems are often associated with dyslexia (Hebert et al., 2018)

Dysgraphia

- A neurological condition characterized by difficulty turning one's thoughts into written language, despite exposure to adequate instruction
  - Listed under specific learning disorder in the DSM-V
  - Can somewhat be a 'catch all' term to diagnose writing difficulties
  - More common in children with ADHD and ASD
- Developmental dysgraphia appears when children are first learning to write
- Acquired dysgraphia can develop after brain trauma

Occupational Therapist ≠ Handwriting Teacher

- General education teachers are primarily responsible for teaching handwriting to young students
- Occupational therapists can offer support to both students and teachers in a collaborative partnership
  - Addressing underlying fine or visual motor skills, perceptual, postural stability, and sensory regulation which may be affecting a student's handwriting performance

Importance of Teaching Handwriting

- In a 2022 systematic review by Ray et al., handwriting instruction during kindergarten improved both writing and reading outcomes including knowledge of letter names and sounds, spelling, and word reading
- Research suggests a strong relationship between the development of early writing and reading skills (Kim et al., 2024)
- Despite the relationship between reading and writing, handwriting is rarely considered in improving reading performance
- To write the letters of the alphabet, students use orthographic and phonological information or memories of each letter shape, formation, and name
- Handwriting facilitates the storage of alphabetic knowledge (shape, formation, name, sound) that can be used to read (Datchuk, 2024)

Common Core

- Common Core standards fail to address handwriting
  - Omits any core standards related to correctly forming, spacing, and sizing letters (Collette et al., 2017)
- Teachers do not feel that there is enough time in the day to target handwriting due to other demands placed on them by Common Core
- Occupational therapists are equipped with the skills needed to not only assist students who need to build handwriting skills, but also **help teachers** develop a plan to teach handwriting

What Can Elementary Teachers Do?

- Schedule a specific time for handwriting instruction
- When students are learning letter identification, also instruct on how to form the letter: appropriate start, size, and shape
- Effective instructional techniques supported by research:
  - Providing visual cues of letter shape and formation (dotted lines to trace, numbers and arrows to show starting and direction)
  - Providing practice for retrieving letters from memory (cover-copy-compare)
  - Utilizing systematic and explicit instruction techniques (lessons featuring scaffolding, teachers model, students practice, test for student proficiency) (Datchuk, 2024)

Pre-Writing and Writing Skills Development

- **12-18 months:** imitates scribbles on paper
- **2 years:** begins to imitate lines: vertical, horizontal, and circular
- **3 years:** copies lines clearly
- **4-5 years:** copies a cross, diagonal lines, squares, and some letters
- **5 years:** hand dominance should be established, copies a triangle, prints name, and copies most lowercase and uppercase letters
- **6 years:** should be able to write the uppercase and lowercase alphabet without omitting letters
- **7 years:** should no longer reverse letters of the alphabet while writing (b/d) and use appropriate capital letters and punctuation when writing sentences (North Shore Pediatric Therapy, 2024)

- **Letter formation** is the foundation of handwriting
- Practicing letter formation in a multi-sensory way improves a student's engagement and retention
- You can get creative with this...remember to make it fun and engaging!

Multisensory Handwriting

- Chalkboard writing
- Forming letters out of play-doh
- Sand and shaving cream writing
- Writing letters in the air
- Building letters out of wikki stix or pipe cleaners
- Writing with a paintbrush and water on sidewalk

Learning Without Tears (Handwriting Without Tears)

- Developed by Jan Olsen, occupational therapist
- Multi-sensory K-5 program using music, manipulatives, and assessments integrated into lessons
- Tailored for educators, special education teachers, and OTs

Size Matters Handwriting Program

- Developed by Dr. Beverly Moskowitz, occupational therapist
- Evidence based and focuses on letter size
- Everyone can use the handwriting books and associated materials
- Can be used with preschoolers, elementary students, and adults

Zaner-Bloser Handwriting

- Upright formation of letters

First Strokes Multi-Sensory Print Program

- Letters are grouped and taught according to their “first strokes”
- Can begin this program in preschool
- Developed by an OT

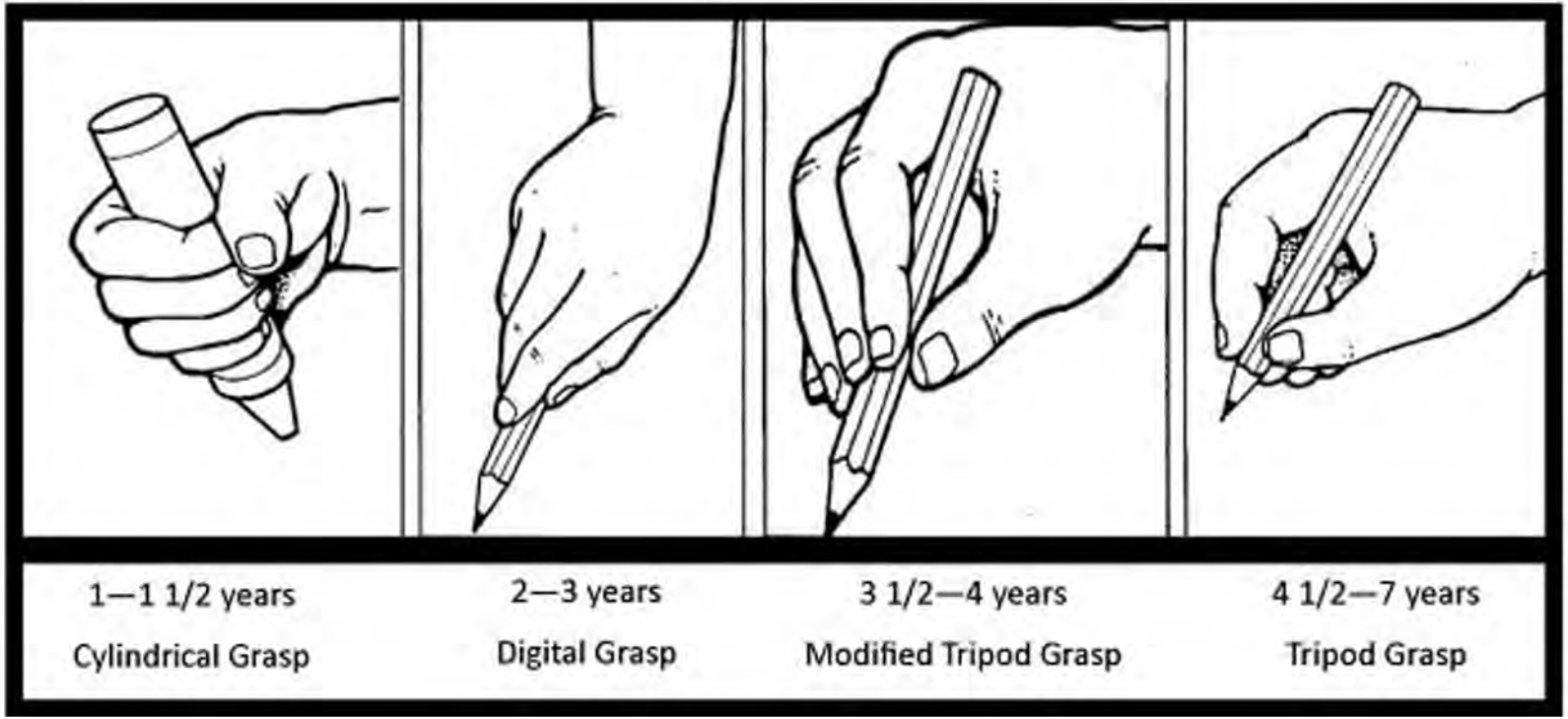
Sensible Pencil

- Children learn to print uppercase and lowercase letters and numbers using eleven basic lines

Big Strokes for Little Folks

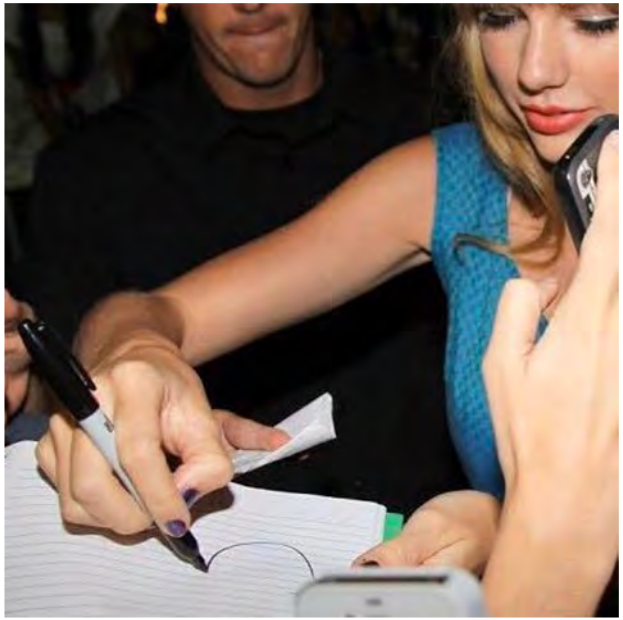
- Developed by an OT for ages 5-9
- For children who already recognize most letters but have had limited success to form them

Development of Pencil Grasp



Functional vs. Non-Functional Pencil Grasp

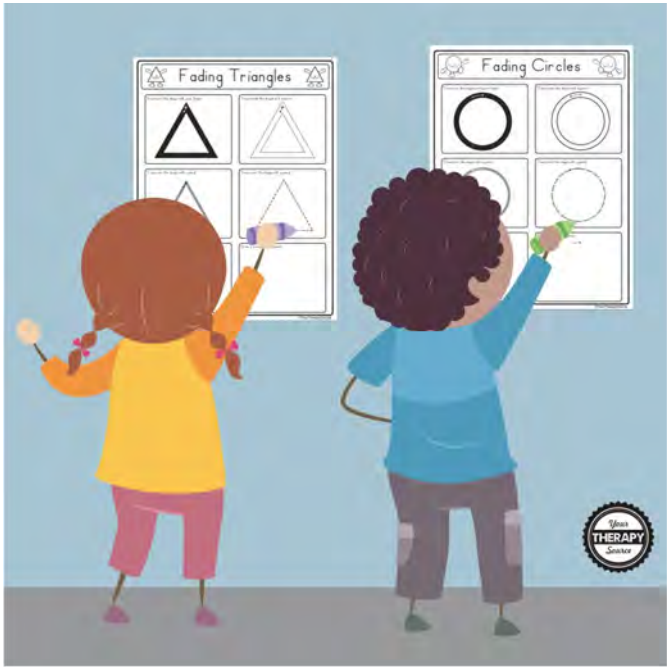
- Most occupational therapists agree that a functional pencil grasp is when a student writes using a pencil both efficiently and effectively
- Functional does not equal a tripod grasp
  - A student can use 3, 4, 5 fingers on their pencil yet write with legibility and efficiency
- A pencil grasp is considered non-functional when when the grasp on the pencil is a cause for illegibility, fatigue, joint strain, or other concerns such as pain (Beck, 2020)



Taylor Swift writes with a functional “modified” tripod grasp.

Improving Pencil Grasp

- Exposure to various pincer grasping fine motor tasks
- Writing on a vertical surface (chalkboard, whiteboard, etc.)
- Writing on a slant board
- Various kinds of grippers to trial
- Golf pencils or Twist N Write pencils
- Holding a cotton ball in ring and pinky fingers while writing
- Writing with lead pencils
- Writing with paper on a soft surface such as a mousepad



Visual Motor Skills Development

6-11 months: finger feeds, reaches for a toy, develops hand-eye coordination by crawling, releases an object upon request

12-17 months: judges the distance to throw an object with some accuracy, imitates stirring with a spoon, places and removes objects from a medium or large container, scribbles on paper

2-2.5 years: turns one page at a time while looking through a book, kicks a ball forward with either foot without support, builds a tower up to 8 blocks high

2.5-3 years: imitates a circle shape, snips paper with child scissors, builds a tower 10 blocks high, completes 3 piece puzzle, catches a large ball thrown from a short distance (Greutman, 2023)

Visual Motor Skills Development

3-3.5 years: copies vertical/horizontal lines and circle shapes, imitates cross shape, throws a small ball overhand with one hand, names an object when only part of it is shown, recalls some parts of a picture

3.5-4 years: completes 4-5 piece puzzle, puts shoes on correct feet, throws a small ball underhand up to 5ft and hits a target at least 2ft off the ground

4-4.5 years: draws a person with 3 different body parts, pedals a tricycle around obstacles, dress and undress without much help, copies color and shape patterns with blocks or beads

4.5- 5 years: follows moving objects with eyes, copies cross shape, cuts a large circle using scissors, connects sequence of dots ½ inch apart to make a simple picture (Greutman, 2023)

Visual Motor Skills Development

5-5.5 years: copies cross shape, square, diagonal lines, imitates “X” shape and triangle shape, catches small ball with hands and chest, draws a person with 6 or more body parts, knows most basic colors and color names, reads and writes numerals 1-5, matches letters in a group of many different letters, groups objects that vary in two ways such as “blue square”, ties shoe independently

5.5-6 years: names most uppercase but not most lowercase letters, recognizes their name in uppercase, recognizes their name when printed with lowercase and uppercase, completes 6-12 piece puzzle, cuts most food with a knife, prints own name in either uppercase or lowercase letters without a model, cuts “X” shape and triangle shape with scissors (Greutman, 2023)

Signs of Visual Motor Skill Problems

Students who struggle with visual motor skills will often have difficulty with handwriting, scissor skills, reading, in addition to:

- difficulty aligning math problems
- poor eye-hand coordination
- poor organization skills
- slow handwriting speed and illegible handwriting
- difficulty following multi-step directions
- reverse numbers/letters when writing
- difficulty copying from the board
- difficulty remembering left/right
- difficulty understanding spatial concepts: in, out, over, under, up, down, etc.
- poor spelling
- remembering the alphabet in sequence and remembering sight words (Greutman, 2023)

Developing Visual Motor Skills

- Completing mazes or “I Spy” activities
- Connect the dots pictures
- Completing age-appropriate puzzles with adult support
- Ball tossing or kicking activities (especially with a target)
- Scissor activities
- Practicing pre-writing lines and shapes with preschoolers and reviewing at the start of kindergarten (before introducing handwriting and letter formations)
- Building with blocks
- Bean bag toss
- Forming shapes out of playdoh (Gruetman, 2023)

Developing Visual Motor Skills

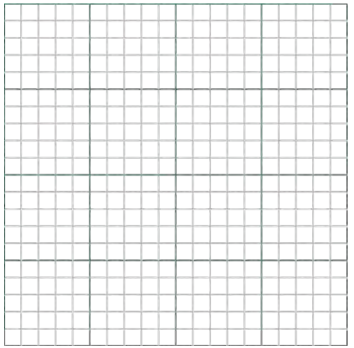
- Coloring within lines
- Stringing beads (smaller sizes for older kids)
- Paper folding activities/origami
- Copying pattern blocks/tangrams patterns
- Using tweezers to pick up objects and place into targets
- Drawing with chalk on a chalkboard
- Creating a picture out of stickers
- Creating patterns with pegs on a pegboard
- Copying patterns onto geoboards (Greutman, 2023)

Visual Accommodations in the Classroom

- Priority seating close to the board
- Reduced visual clutter on student worksheets/presentations/tests/resources for students
    - If worksheets cannot be modified, have student use a piece of paper to cover up information they are not working on
- Workspace free of clutter
- Provide printed copies of notes
- Outlined, fill-in-the-blank style notes
- Use a slant board on desk for worksheets and reading assignments

Visual Accomodations in the Classroom

- Teach word processing skills in order to provide students with alternatives to handwriting
- Graph paper for math assignments
- Use wide ruled paper (or an adapted style of paper) for written assignments
- Consider text sizing: size 12-14
- Consider text font: Arial, Verdana, Helvetica, *Comic Sans*
- Consider lighting: reducing fluorescent lighting if possible, increasing natural lighting
    - Be mindful of glare/reflections



Visual Accomodations in the Classroom

- Use contrasted reading guides/reading windows
- Extended time to complete assignments/tests
- Minimize the amount of work
- Frequent breaks to reduce visual fatigue: break assignments into 10-15 minute segments
- Provide course syllabus and allow students to begin projects and assignments early

Alternatives to Handwriting

- Typing on a computer/tablet
- Predictive text
- Dictation/Speech-to-text (read aloud to check work)
- Symbol-supported communication
- AAC device input converted into text documents
- Handwriting conversion to text
- PDF fillers to type directly onto a worksheet or a form
- Providing a scribe or allowing student to verbally demonstrate knowledge (Breithart, 2023)

When Does Handwriting Development Stop?

- The maturation age of handwriting varies based on individual factors such as motor skills, learning disabilities, and cultural norms
- By third grade, students are expected to have developed legible and efficient handwriting skills
- A study by Feder and Majnemer (2007) highlights that most children achieve basic handwriting proficiency by the end of second grade
- In a 2015 study by Berninger, et al, it was found that students with diagnosed specific learning disabilities in 4th – 9th grade were able to improve their handwriting after completing 18 two-hour lessons on computerized writing instruction

Importance of Postural Stability on Handwriting

- Postural control and hand-eye coordination are functionally linked (Flatters et al., 2014)
- A stable base is required for performing precise motor movements such as handwriting (Flatters et al., 2014)
    - As such, handwriting cannot develop until a child is able to sit/stand upright
- Although most issues with handwriting are associated with fine motor control and visual motor skills, the impact of core stability has on handwriting should always be considered

Signs of Poor Postural Stability

- Slouching in chair
- Leaning in close to desk or frequently laying head down
- Frequently falling or sliding out of chairs
- Constant moving or shifting positions; frequent out of chair behaviors
- Sitting in a “W” position on the floor
- Walking with a wide legged stance
- Avoiding use of non-dominant hand to stabilize paper when writing
- Complains of fatigue or tiredness

Correct Seated Posture for Handwriting

- 90-90-90 rule: elbows should be bent at 90 degrees, hips should be at 90 degrees, knees bent at 90 degrees
- Feet flat on the floor
- Back up straight, inclined slightly towards desk
- Paper stabilized with non-dominant hand
- Trunk is facing desk so non-dominant arm can support body weight
- Paper is slightly tilted up to the right (if right handed), or up to the left (if left handed)
- Desk height should be positioned at student's elbows

Classroom Activities to Improve Postural Stability

- Encourage student to try new equipment on the playground
  - Swings, slides, monkey bars are all activities that increase core strength
- Allow for alternative positions for completing assignments
  - Laying on stomach, seated criss cross, etc.
- Adapted Seating
  - ball chair, wobble stool, sit-n-move cushions
- Perform core strengthening exercises during movement breaks
  - Animal walks, superman holds, yoga positions, wall push-ups

Postural Stability Accommodations and Modifications

- Modify desk height and/or chair height if needed
- Adapted seating
  - Standing desk, wedge cushion
  - Ball chair, wobble stool, t-stool, sit-n-move cushion
- Provide visual cue on desk
  - Printed picture of student engaging in good seated posture
- Provide frequent movement breaks
  - Encouraging students to get up and move during transitions to ensure alertness while also providing breaks to their bodies
- Slant boards to reduce slumping

“Practice does not make perfect. Practice makes permanent.”

- People much wiser than I

(OT Schoolhouse, 2024)

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