

Handwriting on the Wall

Frequently Asked Questions About Chalkboard Activities To Improve Postural Alignment and Fine Motor Control

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Difficulty with handwriting may be the most common reason that schoolchildren are referred for occupational therapy. This functional problem affects almost every aspect of school performance. What theoretical approaches can be used as models of practice for these children? What are the prerequisites for and the components of handwriting? What is the rationale for the value of drawing on vertical surfaces? How can we sequence, individualize, and modify activities to ensure correct motor learning and success for every task component, and yet challenge students toward the next level of achievement?

The following frequently asked questions (FAQs) attempt to answer those questions, with a focus on intervention for performance skills, activity demands, and client factors as *some* of the ways to achieve the targeted outcome, handwriting.

Q. Do prewriting chalkboard activities work for older children, even adolescents?

A. They do. Significant results have been found in research studies and in clinical practice using many of the

activities presented in this article.¹ A survey to determine assessment and treatment approaches commonly used by occupational therapists for children exhibiting handwriting and related fine motor difficulties revealed that a majority evaluated gross and fine motor and perceptual skills, motor planning, quality of movement, and sensory functioning for this population.¹ Most therapists then used an eclectic intervention approach, most frequently using sensorimotor components.¹ Another group of studies questioned whether variations in posture, arm placement, and pencil grip are related to writing performance.² Most concluded that less-than-optimal positional factors do not affect performance in typical children, but may jeopardize success in children with special needs who are vulnerable because of less intact systems that do not adapt easily.² The relationship of visual-motor integration to legibility of handwriting has been well supported by empirical studies in early childhood research.³

Guidelines to successfully teach prewriting skills in early childhood and primary elementary classrooms emphasize basic strokes, as well as readiness, hand development activities, pencil grasp,

SUMMARY

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eye-hand coordination, writing materials, and accommodations.⁴ Some studies from the field of human movement science have concluded that children's handwriting problems can be traced to lack of inhibition of comovements, poor motor planning, coordination of fine motor skills, and visual-motor control.⁵ Occupational therapy intervention studies typically integrate multiple theoretical perspectives, and offer broad-based programs encompassing biomechanical, multisensory, visual-motor, fine motor, and handwriting-specific interventions.⁶

Q. Why do school-based occupational therapists and occupational therapy assistants use chalkboard activities to help children with handwriting problems?

A. They theorize that children who learn basic lines and shapes will have solid visual, perceptual, and motor foundations for constructing letters, words, and sentences.⁶

Q. When and why did teachers first use chalkboards?

A. Historically, one-room classrooms required children to draw and write on their own small chalkboard slates, probably because of limited paper supplies. The Handwriting Without Tears program, created by an occupational therapist, incorporates the use of those slates, for different reasons.^{7,8} For example:

- The contained rectangular shape with raised edges gives the child a tactile frame of reference for learning spatial concepts (left, right, top, bottom).
- The size of the chalk can be varied to elicit specific grasps, individualized for children at different stages (e.g., chalk with a 1-inch diameter, at least 3 inches long, will provide a power grip for the beginner, whereas a tiny piece will require a precise tripod of two fingertips and the thumb).

When schoolrooms were built with large chalkboards on the walls, children were able to line up at the boards to practice their handwriting. Gradually classes became larger and those walls became covered with displays, leaving room for only one chalkboard for the teacher's use. However, some small schools still give children the opportunity to stand and work at wall chalkboards, especially in kindergarten.⁹

Q. What is the value of drawing on vertical surfaces?

A. The first drawings on vertical surfaces were cave paintings at or above eye level. The perceptual value of drawing while standing was discussed in depth by Newell Kephart in his classic text *The Slow Learner in the Classroom*.¹⁰ He believed that through postural adjustments we maintain a constant orientation to the earth's surface and to the environment—our center of gravity. In other words, our point of origin is the gravitational axis of the body. All movement patterns develop from postural mechanisms, so learned movements result from the constant reorganization of those mecha-

nisms. There are no objective directions in space. Concepts such as *laterality* and *directionality* must be learned, through experimentation with movement. For example, the only difference between a "b" and a "d" is laterality. If a child cannot distinguish left and right within the body, those concepts cannot be projected into external space. Kephart also talked about "splinter movements," seen in children who crouch over the desk, grasp the pencil tightly, and display small cramped movements of their fingers and hands. This restricted motor approach represents a *static* motor pattern existing in isolation, "splintered off" from other motor activity, with limited usefulness. Fine motor skills of finger dissociation and grading of muscle activity during pencil grasp must be coordinated with *dynamic* fixation at the wrist, elbow, and shoulder, more easily generalized to a variety of tasks.^{11,12}

Motoric reasons for the standing position are the need for solid postural control (ability to hold the alignment) to write with strength and stability at the trunk, neck, and shoulder, as well as distal mobility for precise visual and fine motor skills. The vertical surface brings the child's wrist into an extended position and helps keep the back straight, with the head and shoulders level. Chalk friction on the board offers an intense sensorimotor experience, as proprioceptive receptors are activated in joints of the fingers, wrist, elbows, and shoulder. This feedback leads to more appropriate motor responses. The therapeutic benefits of using vertical surfaces can be applied to young children learning to draw simple lines and shapes, or older children struggling to print or write letters and words.^{13,14}

Q. Can we use dry-erase boards and markers to get the same results?

A. Not really. The interaction between the chalk and the board provides different proprioceptive input because of the pressure required, unlike the smooth, slippery

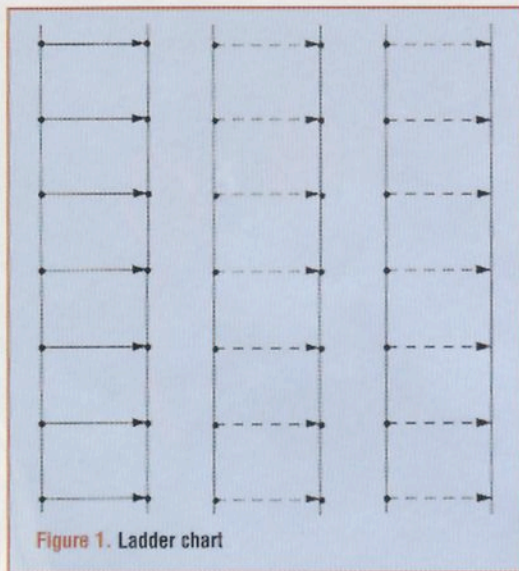


Figure 1. Ladder chart

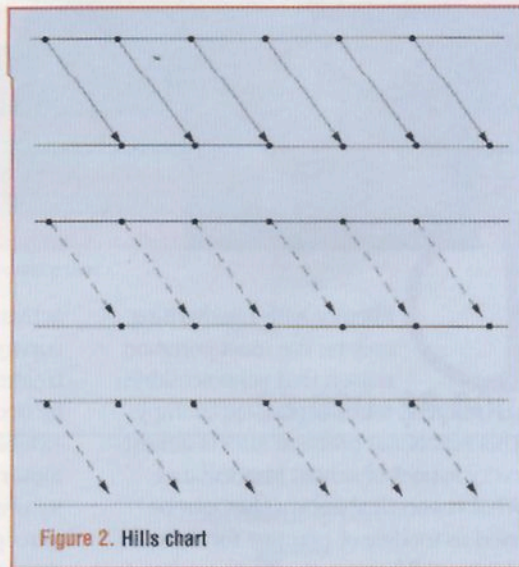


Figure 2. Hills chart

markers and dry-erase board surface. The more intense that input is, the easier it is for the child to learn how to grade pressure, force, direction, and speed.

Q. What are the prerequisites for and components of handwriting?

A. Hand function depends on key proximal components. Not only is postural control essential for children to use their hands efficiently, but also the joints of the shoulder girdle need to allow full *flexibility*, so the arm can move through a wide range of motion in space. At the same time, the shoulder girdle must provide a variety of strong fixed points of stability for actions of the upper extremity. Instability and immature postural control compromise movement patterns and interfere with hand function. Because the shoulder girdle is a floating system, with

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Q. How do we sequence activities for the just-right challenge?

A. Chalkboard activities described in this article are part of the Fine Motor section of the *Visual-Perceptual-Motor Activities Collection*,¹⁹ which is designed for children 4 to 14 years of age. The gross motor, fine motor, and oculomotor tasks and games are developmentally sequenced to promote learning and ensure success through carefully structured activities with the just-right challenge. Each activity chart describes teaching techniques, guides treatment planning, and documents the child's progress. The current chalkboard charts include Racetrack, Car on the Road, Railroad Track, Ladder, Hills, Templates, Auditory Memory, and Clock Game.

The Ladder chart (see Figure 1 on p. 20) can serve as an example of sequencing strategies for learning horizontal lines. All three drawings, copied to the chalkboard by the therapist, are designed to improve accuracy, as well as precise starts and stops, with manual or verbal assistance, if necessary. The first set, repeated as many times as the chalkboard size allows, is simple tracing to install the desired motor pattern. The therapist draws the second set, providing only dots at the beginning and at the end of the visualized line (represented by the dashed line). The third set requires visualization of the second dot as well as the line. After each set is completed, the child will erase the drawings with his or her nonpreferred hand, an opportunity to improve the eye-hand coordination needed for bilateral hand skills. The child is allowed to move to each new task once the previous ones have been mastered.

Another example of sequencing is the Hills chart, which uses similar instructions, but teaches diagonal instead of horizontal lines (See Figure 2 on p. 20).

Charts can be revised, and additional charts can be created to provide more sequencing opportunities. For example:

- Wide lines increase the visual stimulus and decrease the demand for precision.
- Colored chalk increases the strength of the visual cues by adding color contrast to the brightness contrast.
- Wikki Stix can be applied to the chalkboard to provide tactile and kinesthetic information for the child,

only one stable bony attachment at the sternoclavicular joint, misalignment of the pelvis and thorax directly affect shoulder alignment and its muscle actions. Body symmetry for hand function can be achieved more easily in standing than in sitting. Alignment problems distort muscle lines of force, have an impact on arm movements, and cause children to use compensatory patterns that develop into primary problems over time.¹⁵

The development of posture begins from a stable base, integrating stability with mobility, so the body can function in and through space in three-dimensional patterns. Without this normal progression, all related sensorimotor activities (upper-trunk control for hand use and eye-hand coordination) are compromised. The child must be able to receive and process consistent information about the body and its relationship to the environment in order to maintain central nervous system organization.¹⁶

In addition, the foundational prerequisites for efficient, legible handwriting are visual-perceptual-motor components; that is, the integration of gross motor,

fine motor, and oculomotor skills. The occupational therapist's primary role is to determine the underlying motor, sensory, environmental, and perceptual deficits that are interfering with the production of legible handwriting.

Then, through the clinical reasoning process, intervention is planned with additional considerations of context and activity demands, which may need modifications to support participation.^{17,18}

Q. How can we help teachers incorporate vertical chalkboard work into their instruction?

A. We can first suggest that movement and standing help all children be more alert, focus attention better, and release energy that causes fidgeting. We can then point out the therapeutic benefits of postural control for fine motor skill in children who are struggling. We can offer suggestions to incorporate chalkboard work into the classroom, such as all students taking turns at the board. As the activities result in writing improvements, teachers will be able to appreciate the link.

using a finger to trace first.

- A tiny piece of wet sponge can be used to erase by tracing over the line, shape, letter, or number, which increases the visual and motor challenges.⁷

Q. What are some ways to adapt, modify, and generalize these activities?

A. Exploration should always be the first step for the child to learn about the relationship between self and materials (i.e., size, shape, texture) through no-fail activities such as random movements (scribbling) that emerge from experimenting with basic motor patterns. The motor element is primary, and the perceptual element is secondary. The record of these movements (visual counterparts) helps the child stabilize the patterns in time and space, develop perceptual concepts, and begin to recognize symbolic visual patterns in preparation for reading and writing. These scribbles may be done at home (sidewalk or driveway), or at a school or community playground (cement or asphalt).

Instruction for goal-oriented tasks includes four levels of structure, presented in order, until the child can perform each adequately:

1. Brief verbal instruction (no structure)
2. Verbal description (symbolic)
3. Demonstration (imitation)
4. Manual guidance (concrete motor level)

Functional competence is gained by repetition and practice in natural contexts in areas of occupation (activities of daily living, instrumental activities of daily living, education, play), rather than through formal exercises.¹⁸ For example, a small chalkboard can be hung in the home for the entire family to

- write messages (social participation),
- create to-do lists (school homework),
- list grocery items (shopping), or
- have a tic-tac-toe game (play).

Generalization opportunities (similar but not identical activities) are available through variations of movement speed and direction, chalk or crayon size and shape, drawing size and thickness of lines, and especially drawing-surface textures. For example:

- Drawing at an easel
- Drawing murals on newsprint end rolls taped to the wall

- Painting, decorating, or scrubbing walls or fences
- Decorating or washing windows
- Making chalk or crayon rubbings by taping paper over objects on the wall (e.g., coins, leaves, keys, buttons)

Q. What's a good warm-up chalkboard activity?

A. The Racetrack (termed Lazy Eight by Kephart¹⁰) drawing (see Figure 3), copied to the chalkboard by the practitioner, can be a single line serving as a guide, not to be traced exactly.

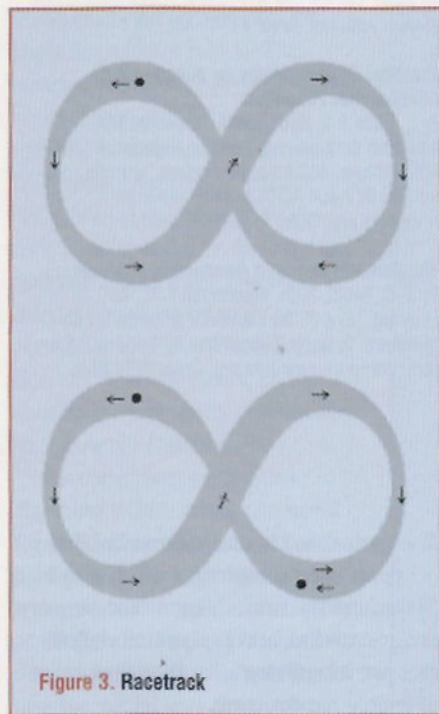


Figure 3. Racetrack

The child's performance goals, monitored by the practitioner, are

- body symmetry and the head stable in midline;
- the eyes dissociating from the head, and the arms dissociating from the shoulders;
- large, free-flowing, rhythmical movements;
- wrist flexibility in response to directional requirements;
- midline crossing without movement interrupted; and
- pressure adjustment to avoid the chalk squeaking or breaking.

The activity begins with the degree of manual or verbal assistance required to achieve the designated performance, gradually reduced or increased as needed. Bilateral movements are first,

with the child instructed to hold chalk pieces in both hands, which move together simultaneously. The suggested grasp is the digital pronate, which facilitates smooth movements, and is often used by artists and architects for sketching (see Figure 4).²⁰ Next, the child repeats the movements with the preferred hand, with the other hand stabilized against the wall. The nonpreferred hand is used to erase, with the hand inside a sock (wet or dry) for more sensory input. After the child has established and maintained directional-

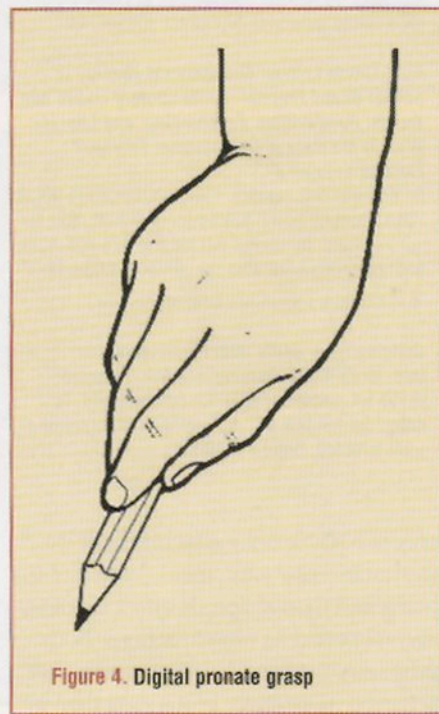


Figure 4. Digital pronate grasp

ity, the next challenge is responding to verbal instructions to reverse direction.

Q. How do we write educationally relevant goals to justify the use of chalkboard activities?

A. We need to meet the requirements of the Individuals with Disabilities Education Act²¹ and the *Occupational Therapy Practice Framework: Domain and Process*¹⁵ by developing an occupational profile and analyzing the student's performance to determine the concerns and needs.²²

For example, the occupational profile can include information from teacher, parent, and child interviews about handwriting illegibility. The desired outcome might be to produce legible handwriting. After this information is identified it should be shared with the individualized

education program team so appropriate goals can be developed and a decision made about the need for occupational therapy intervention. ■

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