# "INTENSIVE SENSORY INTEGRATION INSTRUCTION TRANSFORMS HANDWRITING"

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A recent Wall Street Journal article, "How Handwriting Trains the Brain" [1] could conversely be stated that "Brain Training Changes Handwriting." Technically speaking, increased and retrained brain activity can transform handwriting following twenty hours of intensive multi-sensory integration instruction.

What is Multi-Sensory Integration? Sensory integration can be defined as a successful combination of the visual, auditory, and tactile input processes to the brain. Early pioneer researcher and occupational therapist, Anna Jean Ayres, (1920–1989) [2] wrote several books on the topic describing how deficits in sensory perception blocked informational input to the brain inhibiting motor output.

Her forward-thinking work stirred controversy for a number of years. She wrote, quoted in the 1980s, Wikipedia, [3] "It has not been easy for the helping professions to conceive of human behavior as an express of the brain, and they are still struggling to do so." Unfortunately, these brain-learning, theory-practice amalgams remain today.

Which Cognitive Abilities are Required for Handwriting and Written Communication? Handwriting requires right-brain visual closure and spatial perceptual ability, with left-brain sequencing of letters combined with fine motor coordination.[4] The connection of visual (seeing) and auditory (listening) learning are required for *understanding*, or the "integration of information." [5]

Was Penmanship Taught? It is important to note that penmanship was not trained in my classes; per se. Students were instructed to "Think, Say, Do," following the renowned Bandura's 1971, [6] Social Learning Theory, and the Gillingham & Stillman early reading-phonics multi-sensory model, 1970, which later became the recognized Orton-Gillingham Dyslexia training program.[7]

Can Visual and Auditory Abilities Be Reliably Measured through Formal and Informal Assessments? Recognized norm-referenced, valid and reliable cognitive skills test batteries readily measure these sensory processing areas, The Detroit Tests of Learning Aptitude (DTLA) v. 1, 2 Visual Closure, Letters Sequences,, Auditory Memory for Words, and Oral Directions subtests; v. 3, & 4 subtests came later., (Hammill, 1985;[8] Baker and Leland, 1967, 1935, [9] Pro-Ed). Additionally, Visual and auditory memory subtests from the Woodcock-Johnson Psycho-Educational Battery (1978) were also applied to obtain student baselines.[10]

When I first began testing and retraining cognitive abilities in 1980,[11] it became an ongoing incubation project covering many years of test-teach-test-publish iterations applying my puppetry and choral speech methodology to these recognized research and practice models. The sensory integration interventions revealed pre-posttest training change on the visual closure and letter sequencing DTLA subtests, beginning in 1981 following my program instructional interventions.

Can Handwriting Change Reliably Indicate Changes in Learning Capability? Notable handwriting changes were consistently and immediately evident with a perceptual "turning point" after twenty hours of daily, intensive, multi-sensory training. Fourth and fifth grade students with additional adult pre-to-posttest handwriting and testing cumulative compilations exist, documenting perceptual and fine motor change.

With school classroom 48-Day, 24-hours of prescribed sensory integration implementation, following the same twenty hours of media-based instruction, revealed improved perception, thought, handwriting, and test-taking.

One experimental study evidenced posttest change with one-two-year marked longitudinal student improvement with two classrooms of low-achieving/low auditory processing fourth graders on the Iowa Tests of Basic Skills CogAT Quantitative (pretest 58%-posttest 71%; 2-yr. 70%) and Nonverbal (pretest 59%-posttest 72%; 2-yr. Long 76%) areas. (Iowa Tests of Basic Skills, CogAT[12] and Erland, J. K. 2000,[13] p.20). The CogAT test was externally administered by the school and scored by the Princeton Educational Testing Service (ETS). These results have a high correlation with reading comprehension and mathematical learning. Individual student three-year CogAT trending is on pp. 22-23 of this published report (Erland, 2000).

A sampling from the handwriting perceptual and sequencing change exhibits is available on: http://www.memspan.com/handwriting3.pdf

Early on, it was determined through continuous, in-depth assessment and monitoring of all levels of learners and ages; children, business adults, and college students, that most individuals have information processing weaknesses or cognitive gaps ranging from mild- to- moderate- to- severe. And, unidentified, they are forced to cope with them.

Seeing continuous formal assessment outcome success, the ongoing research was continuously documented (1989-2000) in a scientific publication, The Journal of Accelerated Learning and Teaching. Needing a nominal reference for this research intervention, the edutainment methodology of using puppetry and choral speech was given the name: *The Bridge to Achievement*® (The BTA). The accompanying continuous formal assessment regulated that trained students were not merely "motivated', or thus transformed through positive thinking, but had outcomes of improved reading and math scores. [14] Yet, this overt handwriting transformation also operated as positive personal feedback and as an incentive for learners to "keep trying."

To eliminate the possible motivational contamination of using puppets as "novel stimuli," an eleven classroom experimental study was conducted using an "alternate media activity" for the control groups. [15]

Discovering Learning Issues: Problems in these cognitive and fine motor areas show up in the early grades when basic skills are initially taught, indicating visual perceptual difficulties or directed as ADHD. While many children are formally referred and tested for Special Education from classroom observations, many are not, and subsequently fall through the cracks, missing important inter-sensory training during the critical early years.

Parents should show advocacy and watch for faulty handwriting symptoms and seek professional guidance and direction. Ignoring these critical perceptual symptoms, leads to a life-time of potential auxiliary written communication set-backs and other social-educational learning issues.

Another recent Sped Advisor article by Claire Nissenbaum, M.A., "Messy Handwriting is a Predictor of ADHD in Girls," [16] also indicates perceptual-penmanship red flags, because boys have spatial and coordination advantage over girls, Durden-Smith and DeSimone, 1984.[17] Yet, boys outnumber girls in Special Education referrals and many parents do not want labeling stigma, "Once In, Never Out." p. 115 Turnbull, Stowe, Huerta, 2007.[18]

The bottom line is that perceptual and fine motor skill problems, as evidenced in handwriting samples, can be retrained through cognitive skill sensory integration instruction. Many well-known programs have existed for some time that offers this type of training in varying methodology formats and time requirements, obtaining a range of outcome results.

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