

Montessori and Multisensory Structured Language Therapy Applied to At-Risk Children

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The effectiveness of combining the Montessori method with a Multisensory Structured Language (MSL) Therapy approach to introducing written language to children at-risk for specific learning disabilities is assessed. At-risk children were identified with a battery of tests which indicated a pattern of normal intellectual ability; below average performance on tests of visual and auditory perceptual skills; and deficits in coordination, language and/or attention. Combining Montessori and MSL methods reduced processing errors and enhanced beginning reading skills in at-risk children. Pre and post data comparisons revealed statistically significant gains on verbal intellectual measures, the Draw a Person Test (Goodenough Harris Scale), visual-motor perception tests, upper and lower case recognition, sound/symbol correspondence, and blending sounds into words. Though significant gains were achieved, we suggest continuing language therapy for at-risk children through the early elementary grades. Specific modifications in Montessori presentations for at-risk children are suggested.

The At-Risk Child

The preschool child who is at-risk for specific learning disabilities (Brutten, Richardson, and Mangel 1973; Critchley 1964; Shedd 1967) has deficits in attention, organization, motor skills, perception, and concept formation, and may evidence weaknesses in oral and written language. In Succeeding Against the Odds the author states "Public Law 94-142, the Education for All Handicapped Children Act, defines learning disability as 'a disorder in one or more of the basic psychological processes involved in understanding and using language, spoken or written,

which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, and do mathematical calculations." The federal definition also "states that a specific learning disability exists if the student does not achieve at the proper age and ability levels in one or more of several specific areas when provided with appropriate learning experience, and the student has a severe discrepancy between achievement and intellectual ability in one or more of these six areas: 1. oral comprehension; 2. listening comprehension; 3. written expression; 4. basic reading skill; 5. mathematics calculation; and 6. mathematics reasoning (Smith 1992).

"During the preschool and kindergarten years most of these children's problems take the form of minor discrepancies between observed and expected development. These discrepancies usually appear as poor coordination, perceptual distortions, short attention span, lack of basic concept mastery, incomplete language development, or behavioral problems such as hyperactivity. Learning disabled children have average or above average intelligence; they possess the visual acuity needed to see and the auditory acuity needed to hear; they are not physically handicapped, mentally retarded, or emotionally disturbed. Some children who are unable to perform assigned academic tasks resort to maladaptive behavior to draw their teachers' attention away from these tasks. These children may cause classroom disturbances whenever they are asked to perform in one of their areas of disability. The discrepancy that exists between behavior and the requirements of the school environment may result in frustration, conduct and personality problems, school truancy, and juvenile delinquency (Kirk and Gallagher 1979)" (Faas 1981).

In their collection of scientific studies, Masland and Masland state "the studies reported here verify that a majority of children who subsequently have problems in learning to read have demonstrable deficiencies in the language skills in the preschool years. These deficiencies can be significantly overcome by specific types of instruction during the preschool years directed toward enhancing phonemic awareness (Masland and Masland 1988).

The Montessori Method provides a program which allows diagnostic assessment of the development of attention, organization, motor skills, perception, concept formation, and oral and written language in the child from 3-6 years of age. In addition, the Montessori Method provides a hierarchy of skills to assist the teacher to match her presentation to the child's developmental level. This method also allows the teacher to present materials to the at-risk child 1:1, which is crucial. Since 1970, the first author has been developing specific procedures for combining Montessori techniques with Multisensory Structured Language (MSL) therapy for use with at-risk children. These techniques are described in this study.

Dr. Montessori and Her Method

Dr. Maria Montessori graduated from medical school in 1896 and became the first woman physician in Italy. She worked in the psychiatric department of the University of Rome and became convinced that the mentally deficient children she saw there could be helped by special education. In 1898, Dr. Montessori became the Directress of the State Orthophrenic School where she investigated many of her ideas about education. After two years of work, some of the "retarded" children were able to pass exams and enter normal school. Whether these children were retarded or learning disabled is not known. In 1907, she started using her educational procedures with average children at the Casa de Bambini, a day care center in the poorest slum of Rome. This center served sixty children between the ages of three and seven.

From observations in this children's center, she expanded her ideas about the critical components of a pre-school program. She advocated a "prepared environment" with materials appropriate to the size of the children. To devise this richly "prepared environment," Dr. Montessori clearly delineated the areas of learning, invented materials to present each concept, and wrote detailed descriptions of how each concept could be demonstrated to the child (Montessori 1967). Each presentation proceeded from simple to complex and from concrete to abstract. The classroom teacher presented each activity and invited each child to imitate the task. Young children learn by imitation, and the activities she presented focused each child's "absorbent mind" on interactions with the environment she prepared.

Montessori believed that each child passes through many "sensitive periods" for learning certain skills. Between birth and five years of age (Montessori 1967), each child's development proceeds in a different way at a different rate. Therefore, she let the child choose activities as much as possible, trusting that the child's sensitive periods would guide the work for which he is ready. The teacher follows the child through these basic sensitive periods, guiding as much as she is actually needed. For this "match" system to work, both a clear classroom structure and an observant teacher are needed.

Montessori Curricula

A child's work, Dr. Montessori wrote, "is to create the man he will become. An adult works to perfect the environment but a child works to perfect himself" (Montessori 1967). The Montessori Curriculum encompasses nine basic disciplines divided into four major areas of concentration: Practical Life, Sensorial, Language, and Mathematics. These four major areas are complimented by Social Studies (Geography and History) and Science, and are enriched by art, music, and perceptual motor skills. The Practical Life curriculum includes skills which help the young child master care of self and environment. Motor development and interpersonal relationship skills are incorporated in these tasks. The Practical Life exercises have several primary aims: independence, improvement of eye-hand co-ordination, enhancement of fine motor skills, concentration, sense of order and sequence, as well as task completion.

The Sensorial Curriculum provides a child with visual, auditory, tactile-kinesthetic, gustatory, and olfactory identification and discrimination. "Our senses are the tools for the perception of our surroundings. The environment reaches the individual through the use of the senses" (Montessori 1967). The senses are the receptors of information, the brain interprets the sensorial information, and the nerves transmit energy to the muscles which control movement. Through movement, information seeking (and hence learning) is practiced and refined. This understanding of sensori-motor learning was taken from Sequin (1907) who wrote "Perceptions are acquired by the mind through the senses not by the senses." Piaget also placed strong emphasis on the value of sensori-motor training in the child's cognitive development. "Sensori-motor intelligence lies at the source of thought, and continues to affect it throughout life through perceptions and practical sets...The role of perception in the most highly developed thought cannot be neglected, as it is by some writers" (Piaget 1963).

In the Sensorial materials, each quality (e.g., size) is isolated. Gradations of dimensions are at the levels of "just noticeable differences." The teacher presents contrast and gradation to the child. The child experiences ever closer discriminations within the sensory information. Attention to detail is enhanced. The importance of the Sensorial area is to refine and train the child's senses, allowing the child to establish an order and to clarify what is sensed. These

exercises teach the child to become a precise observer (that is, to contrast, gradate, and generalize) which leads to the abstraction of ideas and to logical thinking. The materials also expand the child's vocabulary. Terms (like large, larger, largest) are taught in a concrete way by feeling the differences. The child becomes more sensitive to the impressions of the environment and is able to distinguish, categorize, and relate new information to that already known. This is the beginning of cognitive development. Since the perceptual interpretations of the at-risk child may be faulty or variable, the use of this curriculum is beneficial in providing the child with experiences which ameliorate misperceptions. Without accurate discrimination, the child will be handicapped in categorizing and classifying their world. With increased discrimination, the child can categorize and classify more accurately and reasoning skills develop.

The language domain includes oral and written language. Oral language precedes written language. Correct speech and pronunciation are essential tools for reading. During the first year of life, as the child proceeds through crying, cooing, babbling, and echoing, to producing the first meaningful words, the child develops an "inner language," an understanding of vocabulary that he is not yet ready to express. A child spends the second year of life bringing this "inner language" to a stage of "expressive language." Oral Language in the Montessori classroom is encouraged through the verbal labeling of the materials used in each activity. The attributes and functions of this material are discussed in the narratives between the teacher, the child, and the other children.

Preparation for writing begins with the Montessori metal insets, which are geometric shapes within frames. The child may trace and fill in these shapes with precise motor movements. The first step a child takes toward reading is the multisensory exercise of tracing sandpaper letters. As the letter is traced, the child repeats the sound of the letter. In this way, the child feels the shape with his finger and arm muscles, sees the letter, and hears the sound. When a child begins to recognize sounds, the identification of sounds in words begins. Many matching activities are created so that the child can practice this essential skill. The child begins to practice writing symbols through the tactile kinesthetic feedback from tracing sandpaper letters.

The child moves through writing to reading within the Montessori method. When a child begins blending sounds together, word building begins using the movable alphabet, a set of individual letters which the child can manipulate to spell word patterns. The difficulty of the word patterns can be controlled by the teacher who prepares boxes of cards which increase in difficulty. As children practice word building, they begin to understand decoding skills. A picture placed next to the word provides a graphic representation of the word. These pictures assist the child in attaching meaning to the word and lay a foundation for comprehension. As a child's skills in word building increase, booklets to read are offered, as well as words, and then sentences, to copy. Children proceed at their own pace to more complex levels of reading, spelling, and writing. Sight words are introduced in a variety of materials.

The mathematics curriculum includes a hierarchical study of numeration, linear counting, skip counting, place value, arithmetical operations, fact memorization, number powers, abstract materials, and other base systems. Each concept is presented to the child with carefully designed manipulative materials. These materials introduce the child to quantities, mathematical patterns, and relationships.

Multisensory Structured Language Method (MSL)

The Alphabetic Phonetic Structural Linguistic Approach to Literacy (APSL), written by Dr. Charles Shedd, was used in this study. The tenants of APSL were used as the basis for a specific manual for younger children (five-seven) in later early childhood studies. This age appropriate multisensory structured linguistic material was titled Sequential English Education (SEE). All multisensory structured linguistic therapy procedures have a core content which must be present. This content includes Phonology, Sound/Symbol Association, Syllabication, Morphology, Syntax, and Semantics. Direct instruction must be synthetic/analytical and proceed in a simultaneous multisensory process which is systematic, cumulative, and taught to automaticity.

APSL and SEE present decoding through a word family approach. The letter a and the short vowel sound "a" are taught as the first letter in the series. The consonant t is taught and its sound "t" associated. Each letter and sound in the series is introduced in a procedure in which visual, auditory, kinesthetic and tactile senses are utilized in learning. When the "a" and "t" sounds are recognized, they are blended to make the word family "at." The next letters taught are other consonant sounds which allow the child to build a decoding vocabulary by reading the word family, adding the beginning sound, then blending the two sound units together to decode a word. The meaning of the word is immediately associated. This strategy is used for all short and long vowel word families in a linguistic hierarchy. The regular patterns of the language are mastered to 90% accuracy before proceeding to more complex irregular patterns as seen in vowels with l and r, diphthongs, irregular vowel and consonant sounds. The entire series is in four manuals with an 18,000 word vocabulary base. The words in the series are taught to enhance reading, writing, and spelling. As each language pattern from the simplest pattern (CVC) to increasingly more irregular patterns are taught, the words for each pattern are practiced in reading, writing, and spelling single words. Each lesson also includes reading the words of the designated patterns in sentences and taking sentence dictation. This requires the child to increase auditory discrimination and memory to proficiency. At the highest level of application, the child is required to create sentences and paragraphs using the word patterns being mastered at a level of independent written expression including punctuation and grammar.

Combining Montessori And MSL Methods

Since Montessori language procedures are systematic and multisensory, the two programs blended easily. The Montessori Sandpaper letters were introduced in the order and organization of the APSL/SEE program and these lessons were followed with the Montessori Sound Boxes in their usual presentation. More direct lessons for at-risk children were needed to achieve sound/symbol correspondence. These lessons were done regularly, kept very short, and successful. After 10 letter/sound correspondencies were mastered, the direct lessons began with the SEE manuals. The letter/sounds were taught in the following order: a, t, p, h, c, n, l, b, f, the, s, g, m, j, v, r, d, i, k, w, wh, z, th, u, sh, e, th, y, ch, q, o, and x. Each lesson contained practice in recognizing letters visually; naming letters; sounding letters; sequencing letters within the alphabet; blending letter sounds into word families; blending letter sounds into words; discriminating upper and lower case letters; writing letters; beginning decoding; and, comprehending. Lessons proceeded from the simple to the more complex patterns of the English

language. The child continued through the Montessori language hierarchy with the addition of a direct MSL therapy session each day.

Public School Early Childhood Education Program

The purpose of this study was to identify children in preschool who were at-risk for specific learning disabilities and to provide an educational program to ameliorate their learning weaknesses. A modification of Dr. Charles Shedd's (1968) identification test battery for older students was used and norms were developed for five and six year old children. The identification test battery included the Slosson Intelligence Test for Children and Adults, the Draw A Person Test (Goodenough Harris Scale), the Peabody Picture Vocabulary Test, the Berea-Gestalt Test of Visual Motor Perception, the Gates MacGinitie Oral Subtests, an alphabet sample, a number sample, and an informal motor assessment.

The Slosson Intelligence Test is an oral intelligence measure. The questions on the test address the following areas: information; vocabulary (verbal comprehension, language encoding); reasoning (verbal, math); visual-motor integration; knowledge of body parts; analogies; number sense; and, sequences (word memory, digits forward, digits backward). This test offers a general indication of whether current intellectual functioning is below average, average, or above average. This intellectual functioning level can be compared with perceptual and academic test results. Reliability and validity assessments yielded correlations in the .90 range (Slosson 1978).

The Draw A Person test has instructions which state, "Draw a person, a whole person, the very best drawing of a person you can." Performance is indicative of one or more of the following: body awareness, self-concept, fine motor ability, visual-motor integration, ability to draw an accurate representation of a mental image, or a combination of some or all of these factors. Performance also is affected by attention, impulsivity, organization, and personality. The score is based on 73 aspects of the drawing (e.g., size, shape, proportion, number of specific parts, and appropriateness of details). Reliability and validity assessments yielded correlations in the .90 range (Measurement of Intelligence by Drawings, Goodenough 1926/1992).

The Berea-Gestalt is a measure of visual-motor perception. There are 12 figures (one per card) shown one at a time to the child. Only the untimed Berea is administered to children five to seven years of age. The child, while looking at each card, copies the design. Scores of 25 and above are indicative of visual-motor perceptual weaknesses in this age group. The informal motor assessment includes measures of directionality, motor skills/coordination, motor skills/balance, body imagery, right/left dominance, fine motor skills, articulation, and expressive language. Reliability and validity estimates were not available.

The Gates MacGinitie Oral Subtests measures the pre-reading skills of upper case letter recognition, lower case letter recognition, letter/sound association, and sounds to word blending. Each of the first three subtests has 26 items; the blending subtest has 15 items. The Alphabet Sample provides an example of the student's handwriting in 26 printed or cursive upper case or lower case letters. The number sample provides an indication of the student's ability to write numerals. Reliability and validity assessments yielded correlations in the .87 range (MacGinitie 1965).

The pattern of performance on the test battery which indicated "at risk" included (1) a Slosson IQ score in the average range, 90 or above; (2) a Slosson Item Analysis pattern which indicated errors in visual and auditory processing; (3) a Draw a Person score 20 or more points

below the verbal Slosson IQ score (poor quality of drawing, lack of cohesive figure, fine motor skills difficulty, etc.); Gates MacGinitie Subtest identification scores (capital and lower case and sounds) and a blending score below average for age and IQ; (5) an alphabet sample below average for age and IQ; and difficulties in sequencing and forming letters, and a fine motor skill rating of low average to low; (6) a number sample below average for age and IQ; and difficulties noted in sequencing and forming numbers, and a fine motor skill rating of low average to low. This criteria was established by using Shedd's 23 characteristics for diagnostic criteria for older students and the experimental data reported in the Early Childhood Study conducted by the Natchez-Adams County School System in co-operation with HEW in 1970.

Method

Subjects

Twenty-two children ranging in age from 4.9 to 7.7 years were in the Early Childhood Education classroom. Sixteen were African-American; six were Caucasian. The class included nine girls and 13 boys with an IQ range of 75-126 and a mean IQ of 103. The Identification Battery indicated 21 of these children were at-risk; one student scored within normal limits.

Twenty-eight students ranging in age from 5.2 to 6.1 years were in the Regular Kindergarten Classroom. All 28 students were Caucasian. The class included 14 girls and 14 boys with an IQ range of 78-145 and a mean of 116. The identification battery indicated five children were at-risk, three were borderline, and 20 were within normal limits.

Design

Though not planned, registration at the two schools chosen for the kindergarten study resulted in a majority of the children in the Early Education Center (Montessori) program being at-risk. The goals of the Early Childhood Education (Montessori) Program were to expose each child to the skills necessary for academic learning in the early elementary grades. The goals of the Regular Kindergarten Program were to allow children to relate to adults and children outside their home and to introduce preacademic skills such as coloring, cutting, pasting, etc.

The Montessori program was applied to the at-risk group by a project directress and a classroom directress who had training in and knowledge of learning disabilities. Pre- and post-testing occurred in October and May.

Results

Slosson IQ

Application of a two (Groups: At-risk, Normal) by two (Time: Before, After) mixed design analysis of variance to the Slosson IQ scores revealed a significant main effect for Time ($F = 61.29$; $df = 1,42$; $p < .05$), and a significant Groups by Time interaction ($F = 14.46$; $df = 1, 42$; $p < .05$). The failure to find a significant main effect for Groups indicates the mean Slosson IQ obtained for the At-risk group (109.85) did not differ significantly from the mean Slosson IQ obtained for the Normal group (118.39). The significant main effect for Time indicates the mean Slosson IQ obtained before (111.03) was significantly lower than the mean Slosson IQ obtained after (1119.16). The significant Group by Time interaction indicates the mean increase in IQ from before to after was greater for the at-risk group (13.59) than for the Normal group (4.70)

resulting in the After IQ for the at-risk group (116.65) equaling the Before IQ for the Normal group (116.04). (See Table 1 - The Slosson score means.)

The significant gain on the Slosson Test of Intelligence for the at-risk group was not anticipated. An analysis of the Slosson gains by sub-test indicated that Auditory Vocal Association Analogies, Auditory Vocal Sequential Memory, Visual Motor Integration, Number Sense Cardinality, Reasoning, Information, and Language Encoding all showed positive improvements. Evidently, the Montessori/MSL curriculum contains specific practice in visual and auditory discrimination and memory, which enhances the perceptual skills underlying oral language and the associated written symbols of language and mathematics allowing the students to answer the questions on the Slosson Test more accurately.

Draw a Person

Application of a two (Groups: At-risk, Normal) by two (Time: Before, After) mixed design analysis of variance to the Draw A Person scores revealed significant main effects for Groups ($F = 19.36$; $df = 1,43$; $p < .05$) and for Time ($F = 24.27$; $df = 1, 43$; $p < .05$), as well as a significant Groups by Time interaction ($F = 6.13$; $df = 1,43$; $p < .05$). The significant main effect for Groups indicates the mean Draw A Person score obtained for the At-risk group (65.87) was significantly smaller than the mean Draw A Person score obtained for the Normal group (95.03). The significant main effect for Time indicates the mean Draw A Person score obtained before (76.37) was significantly smaller than the mean Draw A Person score obtained after (91.66). The significant Groups by Time interaction indicates the mean increase in Draw A Person score from before to after was greater for the At-risk group (29.74) than for the Normal group (6.52) resulting in the After Draw A Person score for the At-risk group (80.74) becoming much closer to the Before Draw A Person score for the Normal group (91.77). (See Table 1 - The Draw A Person score means.)

The major change in the quality of these drawings reflected an integration of the parts of a body into a whole figure as the year progressed. The Before (October) drawings revealed a tendency of the at-risk students to draw an eye, mouth, nose and/or hair as isolated and unconnected to other parts of the body. The After (May) drawings revealed a Gestalt of the whole body with some of its parts, a more age-appropriate representation. These gains were attributed to several factors in the curriculum: The practical life and sensorial curricula emphasizes on the development of hand co-ordination for writing enhanced the development of fine motor skills and eye-hand co-ordination; the Montessori metal inset activity improved the precise motor movements used in writing; and, both the perceptual motor skills and the oral language development programs emphasized body image. Moreover, all Montessori activities proceed from whole to part to whole which helps in the understanding of figure ground and Gestalt perceptions. Evidently, these frequent opportunities for fine motor skills practice and perceptual discrimination made the at-risk group more aware of detail and how to organize a drawing task.

Berea Gestalt

Application of a two (Groups: At-risk, Normal) by two (Time: Before, After) mixed design analysis of variance to the Berea Gestalt error scores revealed significant main effects for Groups ($F = 50.65$; $df = 1,45$; $p < .05$) and for Time ($F = 110.28$; $df = 1,45$; $p < .05$), as well as a significant Groups by Time interaction ($F = 22.25$; $df = 1, 45$; $p < .05$). The significant main effect for Groups indicates the mean Berea Gestalt error score obtained for the at-risk group (39.87) was significantly greater than the mean Berea Gestalt error score obtained for the Normal

group (25.55). The significant main effect for Time indicates the mean Berea Gestalt error score obtained before (34.51) was significantly greater than the mean Berea Gestalt error score obtained after (26.69). The significant Groups by Time interaction indicates the mean decrease in Berea Gestalt error score from before to after was greater for the at-risk group (10.05) than for the Normal group (3.82) resulting in the After Berea Gestalt error score for the at-risk group (34.84) becoming much closer to the Before Berea Gestalt error score for the Normal group (27.46). (See Table 1 - The Berea Gestalt error score means.)

The decrease in errors on this test of visual motor perception indicates the Montessori/MSL curriculum includes many opportunities for the at-risk child to enhance visual discrimination and memory. The sensorial curriculum is devoted to the use of the senses to discriminate finer and finer details of size, shape, color, pitch, tone, volume, weight, tactation, stereognostic information, smell, and taste. This training in attention to both gross and fine differences focuses the student on sensory input and improves the ability to perceive highly subtle discriminations within language and math symbols. This sensorial-perceptual ability is the basis for success in later academic tasks: reading, writing, spelling, and math. Usually, it is assumed that these perceptual skills will develop normally and a child will be "ready" at a given time for higher cognitive learning. This assumption is not accurate. At-risk children evidence perceptual errors and inaccuracies which interfere with their mastery of language symbols and persist into adulthood. However, these errors may be improved through direct training in early intervention.

Gates MacGinitie Upper Case

Application of a two (Groups: At-risk, Normal) by two (Time: Before, After) mixed design analysis of variance to the Gates MacGinitie Upper Case scores failed to reveal a significant main effect for Groups ($F = 0.42$; $df = 1,45$; $p > .05$), but revealed a significant main effect for Time ($F = 319.27$; $df = 1,45$; $p < .05$), as well as a significant Groups by Time interaction ($F = 75.00$; $df = 1, 45$; $p < .05$). The failure to find a significant main effect for Groups indicates the mean Gates MacGinitie Upper Case score obtained for the at-risk group (13.13) did not differ significantly from the mean Gates MacGinitie Upper Case score obtained for the Normal group (14.29). The significant main effect for Time indicates the mean Gates MacGinitie Upper Case score obtained before (7.53) was significantly smaller than the mean Gates MacGinitie Upper Case score obtained after (20.11). The significant Groups by Time interaction indicates the mean increase in Gates MacGinitie Upper Case score from before to after was greater for the at-risk group (20.58) than for the Normal group (7.15) resulting in the After Gates MacGinitie Upper Case score for the at-risk group (23.42) being larger than the After Gates MacGinitie Upper Case score for the Normal group (17.86). (See Table 1 - The Gates MacGinitie Upper Case score means.)

Gates MacGinitie Lower Case

Application of a two (Groups: At-risk, Normal) by two (Time: Before, After) mixed design analysis of variance to the Gates MacGinitie Lower Case scores failed to reveal a significant main effect for Groups ($F = 0.26$; $df = 1,45$; $p > .05$), but revealed a significant main effect for Time ($F = 204.93$; $df = 1,45$; $p < .05$), as well as a significant Groups by Time interaction ($F = 11.79$; $df = 1, 45$; $p < .05$). The failure to find a significant main effect for Groups indicates the mean Gates MacGinitie Lower Case score obtained for the at-risk group (11.32) did not differ significantly from the mean Gates MacGinitie Lower Case score obtained for the Normal group (10.56). The significant main effect for Time indicates the mean Gates

MacGinitie Lower Case score obtained before (5.20) was significantly smaller than the mean Gates MacGinitie Lower Case score obtained after (16.53). The significant Groups by Time interaction indicates the mean increase in Gates MacGinitie Lower Case score from before to after was greater for the at-risk group (14.73) than for the Normal group (9.03) resulting in the After Gates MacGinitie Lower Case score for the at-risk group (18.68) being larger than the After Gates MacGinitie Lower Case score for the Normal group (15.07). (See Table 1 - The Gates MacGinitie Lower Case score means)

Gates MacGinitie Sounds

Application of a two (Groups: At-risk, Normal) by two (Time: Before, After) mixed design analysis of variance to the Gates MacGinitie Sounds scores revealed significant main effects for Groups ($F = 21.54$; $df = 1,45$; $p < .05$) and for Time ($F = 22.11$; $df = 1,45$; $p < .05$), as well as a significant Groups by Time interaction ($F = 10.66$; $df = 1, 45$; $p < .05$). The significant main effect for Groups indicates the mean Gates MacGinitie Sounds score obtained for the at-risk group (3.53) was significantly greater than the mean Gates MacGinitie Sounds score obtained for the Normal group (0.63). The significant main effect for Time indicates the mean Gates MacGinitie Sounds score obtained before (0.53) was significantly smaller than the mean Gates MacGinitie Sounds score obtained after (3.06). The significant Groups by Time interaction indicates the mean increase in Gates MacGinitie Sounds score from before to after was greater for the at-risk group (4.95) than for the Normal group (0.89) resulting in the After Gates MacGinitie Sounds score for the at-risk group (6.00) being much greater than the After Gates MacGinitie Sounds score for the Normal group (1.07). (See Table 1 - The Gates MacGinitie Sounds score means.)

Gates MacGinitie Blends

Application of a two (Groups: At-risk, Normal) by two (Time: Before, After) mixed design analysis of variance to the Gates MacGinitie Blends scores revealed significant main effects for Groups ($F = 104.63$; $df = 1,45$; $p < .05$) and for Time ($F = 163.00$; $df = 1,45$; $p < .05$), as well as a significant Groups by Time interaction ($F = 97.59$; $df = 1, 45$; $p < .05$). The significant main effect for Groups indicates the mean Gates MacGinitie Blends score obtained for the at-risk group (5.71) was significantly greater than the mean Gates MacGinitie Blends score obtained for the Normal group (0.59). The significant main effect for Time indicates the mean Gates MacGinitie

Table 1
Comparison of Before and After Scores of At-Risk and Normal Children

The Slosson score means.					
Group		Before	Time After	Mean	Gain
At-risk	N=17	103.06	116.65	109.85	13.59
Normal	N=27	116.04	120.74	118.39	4.70
Mean		111.03	119.16	115.09	8.13
The Draw A Person score means.					
Group		Before	Time After	Mean	Gain
At-risk	N=19	51.00	80.74	65.87	29.74
Normal	N=26	91.77	98.29	95.03	6.52
Mean		76.37	91.66	84.02	15.29
The Berea Gestalt error score means.					
Group		Before	Time After	Mean	Gain
At-risk	N=19	44.89	34.84	39.87	-10.05
Normal	N=28	27.46	23.64	25.55	-3.82
Mean		34.51	26.69	30.60	-7.82
The Gates MacGinitie Upper Case score means.					
Group		Before	Time After	Mean	Gain
At-risk	N=19	2.84	23.42	13.13	20.58
Normal	N=28	10.71	17.86	14.29	7.15
Mean		7.53	20.11	13.82	12.58
The Gates MacGinitie Lower Case score means.					
Group		Before	Time After	Mean	Gain
At-risk	N=19	3.95	18.68	11.32	14.73
Normal	N=28	6.04	15.07	10.56	9.03
Mean		5.20	16.53	10.87	11.33
The Gates MacGinitie Sounds score means.					
Group		Before	Time After	Mean	Gain
At-risk	N=19	1.05	6.00	3.53	4.95
Normal	N=28	0.18	1.07	0.63	.89
Mean		0.53	3.06	1.80	2.53
The Gates MacGinitie Blends score means.					
Group		Before	Time After	Mean	Gain
At-risk		2.21	9.21	5.71	7.0
Normal		0.14	1.04	0.59	.9
Mean		0.98	4.34	2.66	3.36

Blends score obtained before (0.98) was significantly smaller than the mean Gates MacGinitie Blends score obtained after (4.34). The significant Groups by Time interaction indicates the mean increase in Gates MacGinitie Blends score from before to after was greater for the at-risk group (7.00) than for the Normal group (0.90) resulting in the After Gates MacGinitie Blends score for the at-risk group (9.21) being much greater than the After Gates MacGinitie Blends score for the Normal group (1.04). (See Table 1 - The Gates MacGinitie Blends score means.)

The Early Childhood class of at-risk children showed greater improvement than the Regular Kindergarten group of normal children in learning Upper Case, Lower Case, Sounds, and Blends as measured on the Gates MacGinitie sub-tests. The Montessori language materials and the therapy techniques of the MSL method impacted the mastery of the language code and its decoding to a significant degree. Clearly these were goals of the Early Childhood program, and the materials and methods used presented this directly to the children. The Regular Kindergarten children did not receive any direct instruction in the letters, sounds, and blends. Even so, they made gains in these areas from incidental exposure. Regular Kindergarten children master the letter/sound symbols and blending skills in the first half of the first grade. These normal children should surpass the at-risk children, unless specific teaching in a MSL program is continued for the at-risk children. Early intervention techniques helped the at-risk children score at levels closer to the normal children, but visual and auditory perceptual weaknesses are still present and remediation should be continued.

Discussion

Our combination of Montessori and MSL methods reduced processing errors and enhanced beginning reading skills in children at-risk for learning disabilities. Pre and post data comparisons revealed statistically significant gains for these children on verbal intellectual measures, the Draw a Person Test (Goodenough Harris Scale), visual-motor perception tests, upper and lower case recognition, sound/symbol correspondence, and blending sounds into words. In contrast, the normal children in the regular kindergarten who indicated a greater mean intellectual functioning and were not at-risk for a learning disability did not improve as much on tests of IQ, visual-motor perception, or pre-reading skills. The regular kindergarten program did not offer them the opportunity of direct instruction in pre-reading skills. Our expectations are twofold: First, the normal children will surpass the at-risk children when direct instruction in reading begins in grade 1; and, second, the at-risk children could work at grade level if their Montessori and MSL program continued in grade 1.

Several factors are important in applying the Montessori method to the at-risk child. A critical difference between the at-risk and normal child involves making an independent choice of material and developing a work cycle. A major tenant of the Montessori philosophy is to observe and "follow the child" as a guide for making presentations at varying levels of difficulty. The normal child directs himself to the challenges of the unknown and enjoys the satisfaction of mastering new tasks. With normal children the Montessori teacher orders the learning environment and only guides learning when needed. Since the normal child proceeds in a sequential manner through the sensitive periods for learning critical skills (e.g., order and oral language), the teacher can anticipate the child's development and make presentations accordingly.

The at-risk child is easily defeated, and avoids tasks that are perceived as difficult, or might lead to failure. A normal work cycle is not developed. Hence, the teacher must remain in

the learning environment longer, guide the choice of activities more directly, and assist in organizing activities more frequently. Since the at-risk child's development is disordered and visual or auditory information often is misperceived, the teacher must observe developmental levels more closely. These developmental levels may be erratic and skill development may be uneven. Often repeated presentations in small steps are necessary.

The Montessori classroom, structured for individualization, provides the teacher with procedures for helping the normal child explore the world and discover concepts. Also, it provides more guidance for the at-risk child, helping develop a work cycle and better organization. Within each area of the curricula, the teacher must recognize learning opportunities for the at-risk child. In the Practical Life curriculum, the normal child may practice and enhance eye-hand coordination, fine motor skills, and a sense of order or sequence. For the at-risk child, these presentations may be used to develop deficient skills. This requires more frequent presentations of segments of each skill. For example, in the pouring exercises, the at-risk child may need to work on the motor skills of holding a pitcher before the pouring task can be accomplished. The most important skill enhanced in working with the practical life exercises is attending. The sequential steps involved in these exercises help focus attention and concentration.

In the Sensorial curriculum, the normal child refines abilities to explore, gradate, and classify the world through the five senses. This curriculum can be critical in assisting the at-risk child who may be misperceiving much of the sensory input necessary for assimilating perceptions accurately and attaching language. The sensorial presentations are diagnostic and remedial in identifying confusion. Our data indicate the sensorial materials assist the at-risk child in visual motor integration, auditory vocal sequential memory, auditory vocal analogies, and language encoding. All are measured on the Slosson Intelligence Test. In addition, visual motor perception gains are reflected in the 10 point improvements in the Berea Gestalt error scores.

Since all teacher presentations begin with the silent demonstration of a motor skill and language is attached after the correct perception is achieved, the Montessori program allows the normal child to increase his vocabulary and become more precise with his oral expression. For at-risk children demonstrating oral language deficits, the presentations help achieve an accurate vocabulary in an orderly way. The Montessori teacher must be aware that the at-risk child may proceed more slowly in acquiring language concepts and need an enriched oral language program. In this study, positive gains in oral expression increased the scores on the verbal intelligence measures.

In normal childrens' exposures to letters, sounds, blending, and beginning reading, information is absorbed in a spontaneous way. The normal child learns many patterns simultaneously and applies these to all language skills (reading, writing, and spelling). The normal child quickly begins to associate visual symbols and sounds; remembers information after several exposures; grasps the concept of blending; begins to use "key words" in a word pattern to help read other words (hat, cat, sat, etc.); begins decoding and comprehension; and, begins writing. An at-risk child has difficulty in sound-symbol associations, blending, and using "key word" patterns to generalize other words. Not able to master the code, the at-risk child relies on memory, avoids language activities (if possible); appears "nervous" when asked to work with language; and struggles with written work. The at-risk child has visual and auditory perceptual dysfunctions which make a sequential presentation of the hierarchy of language skills mandatory. Therefore, the at-risk child requires a MSL approach in which the alphabetic and

phonetic information of the language is taught in a structured hierarchy through multisensory techniques. Our data indicated that the at-risk children gained letter/sound associations, blending, and beginning decoding skills through these procedures.

The Montessori/MSL program will not “cure” the at-risk child, but progress in oral and written language skills is enhanced. The materials and techniques of the Montessori method help the at-risk child resolve underlying perceptual confusions which negatively impact oral and written language development. However, the Montessori teacher must be sensitive to the specific problems of the at-risk child to apply the program in an effective manner.

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