

## **MONTESSORI APPLIED TO CHILDREN AT HIGH RISK**

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### **The High Risk Child**

The child who is High Risk for learning disabilities (Shedd 1967) (Brutten, Richardson, Mangel 1973) (Critchley 1964) has deficits in attention, order and organization, gross and fine motor skills, perceptual confusions causing faulty concept formation, may evidence weaknesses in oral language development, has difficulty learning the written symbols and patterns of language, and may exhibit problems with the abstractions of math. In 1969 Dr. Sylvia Richardson suggested to this author that the Montessori Method provides a program which allows diagnostic teaching in all of these areas and a hierarchy of skills with which the teacher may help each child match his work to his developmental level. It also provides a model in which the teacher can present materials to the High Risk child 1:1, as Montessori frequently mentioned was crucial with this population. From 1970 to the present the specific procedures in which Montessori can be applied to High Risk children have been studied and are described in this paper.

If each of the areas of attention, organization, perception, motor development, language and math is examined for the average child and the differences of the High Risk child contrasted, a clearer understanding of the unique components that the Montessori method offers to the educator of High Risk children is appreciated.

### **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. Traveling to London and Paris she studied the work of Jean Itard and Edouard Seguin, two pioneers in the field of sensory 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. Montessori wondered what her procedures would do to help children whose intellectual functioning was average and above. A question arises as to whether these children were actually retarded or would be today characterized as learning disabled.

She returned to the University of Rome to study philosophy, psychology and anthropology. She made a greater study of the work of Itard and Seguin, studied the nervous diseases of children, published, practiced in hospitals and clinics of Rome, as well as maintaining a private practice.

In 1907 she finally got the chance to begin to use some of her educational procedures on a population of average children. The Casa de Bambini which she set up was a day care center in the poorest slum area of Rome, the San Lorenzo district. The center served sixty children between 3 and 7. The teacher was a servant girl. At this point Montessori had no specific method in mind. She wanted to observe the children interacting with the sensorial materials that she had begun to develop. She trained the teacher and spent as much time as she could supervising the class, observing and taking notes on the children's learning patterns. From these observations she expanded her ideas on the critical components of a pre-school program.

She noted in her writings the differences she discovered in working with the average children in comparison with the mentally deficient children of her earlier study. One of the marked differences was that the average children did not require the 1:1 relationship with the teacher in their exploration of the sensorial materials that the children with learning difficulties needed. The average children seemed drawn to certain works and practiced these at length as if they were answering some inner need to master the task. These children developed a cycle of work in which they chose one material after another varying their type and level of difficulty. The children who were considered mentally deficient had needed closer direction by the teacher, avoided works they seemed to sense they could not do, and did not develop a cycle of independent work. The teacher had to help train the child in all these work habits and when Montessori saw these traits develop in the child with deficiencies she characterized this shift as "normalization".

### The Prepared Environment

Dr. Montessori advocated a "prepared environment" and materials appropriate to the size of the children. The furniture, counters, shelves, and sinks are scaled to the children's height. This is commonplace today but was revolutionary in 1898. The activities for investigating new ideas are

placed on trays with the precise items needed to investigate a concept. The trays are on open shelves so that the child can easily see the works and make choices of the work he wishes to do.

To devise the rich "prepared environment" Dr. Montessori clearly delineated areas of learning, invented materials to present each percept/concept and wrote detailed presentations of how each material could be demonstrated to the child. (Montessori 1966) Each presentation proceeds from simple to complex and from the use of concrete materials to abstraction.

### **The Role of the Teacher (Directress)**

The classroom teacher presents these activities and invites the child to imitate the task. Montessori recognized that young children learn by imitation. She uses their "absorbent mind" in allowing the children to interact with the environment the educator prepares.

Each presentation is made slowly, carefully enhancing the child's attention and awareness of detail. The child in his practice with the activity increases his eye-hand co-ordination, fine motor skills, sense of order, organization, ability to sequence; in short the skills necessary to go about a learning task. She offers the child the opportunity to perfect his skills, to learn how to learn. The teacher is to present the concepts and guide as much or as little as needed.

The child is to choose his own work, as Montessori believed that between birth and five years of age the child passed through many "sensitive periods" for learning certain skills. (Montessori 1967) She recognized that each child's development proceeded in a different way and at a different rate, therefore she let the child lead in the choice of activities, as much as possible, trusting that the child's sensitive periods are guiding him to choose the work for which he is ready. The teacher "following the child" in these basic sensitive periods is to guide as much as she is actually needed.

For this system of "match" to work, a clear structure of classroom procedure and an observant teacher is needed. In the Montessori system the teacher presents the "activities" on the shelves to children individually or in small groups. The children may choose any activity to explore. The teacher's presentations are based on the observations that she does of each child's work choices and the growth and development she notes during these observations. Often the child asks for the presentation of the activity. She follows the child's lead but she has the knowledge of the sensitive periods and the hierarchy of skills through which the child is working. If the child chooses at a level too difficult and frustrating, she helps him move to a level of success and begins his forward progression again. If he is choosing at too low a level, becoming bored by only repeating skills he has well established,

the teacher's job becomes to stimulate and challenge the child in her next presentations.

## Curriculum

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. The four major areas of concentration are Practical Life, Sensorial, Mathematics and Language. The Social Studies (Geography and History) and Physical Sciences complement the four basic areas. Enriching these areas are art, music, and perceptual motor skills. (Table I - IV outline the basic areas of the Montessori Curriculum.)

The Practical Life curricula includes skills which help the young child master care of self and environment. Incorporated in these tasks are motor development and interpersonal relationship skills. (Table I)

The Practical Life exercises have several primary aims: independence, awareness of the environment, concentration, sense of order and task completion. Through concentration and order the child is being prepared for future academic work. The contact with a real environment results in an orientation toward reality. Tasks such as scrubbing a table are meant to provide the gross motor skills that must precede the more delicate manipulations and the precise co-ordination required for more advanced activities such as reading and writing.

Zaporozhets, a Russian psychologist, who worked on functions of orientation (attention) proposed that attention can be modified by motor mediation (motor training). This premise is shown to be true in observing children in a Montessori environment; particularly with the Practical Life materials. As the child, through the teacher's careful presentations, begins to attend to detail, his eye-hand co-ordination is seen to improve and his motor movements are seen to slow as he attempts to carefully make each required movement for success in the task. As these motor skills are refined the child's attention/concentration is required and hence he becomes more focused. For all children this focus on a work task and lengthened attention span are important, but for the High Risk child it is critical.

Through these initial seemingly simple work tasks the child learns to set up and organize a work environment; in other words he learns how to go about a learning task. These strategies are the very abilities that are usually reported as deficient in the High Risk child and always noted as a weakness of learning disabled students.

"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 then are the receptors of information, the brain then interprets the sensorial information, and the nerves transmit energy to the muscles which control movement. Through movement, information and hence learning is practiced and refined. This understanding of sensori-motor learning was taken from the work of Seguin who wrote "Perceptions are acquired by the mind through the senses not by the senses." (Seguin 1907)

Piaget also placed a 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)

The Sensorial Curricula provides a child with investigation of visual, auditory, tactile-kinesthetic, gustatory and olfactory identification and discrimination. (Table II) The visual sense is related to the perception of color (red, blue); form (circle, square); and dimension (long, short). The tactile sense discriminates the feel of rough, smooth; hot, cold; light, heavy. The auditory sense is the perceiving and discrimination of sounds. Through the Montessori bells, the child learns to distinguish between high and low tones and the gradation of tones. The Sound Boxes help a child distinguish soft from loud and similar sounds. The gustatory and olfactory senses are developed through tasting and smelling experiences.

In the Sensorial materials each quality, such as size, is isolated. Gradations of dimensions are at the level of "just noticeable difference." The teacher presents contrast and gradation to the child. The child in working with the materials experiences ever closer discriminations of sensory information. Attention to detail is further 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 he senses. These exercises teach the child to become a precise observer, to contrast and gradate and to generalize, which leads to the abstraction of ideas, leading to logical thinking.

The materials also serve to expand the child's vocabulary. Terms like large, larger, largest are taught in a concrete way, by manipulating and feeling the differences. The child being more sensitive to the impressions of the environment is able to distinguish, categorize and relate new information to what he already knows. This is the beginning of his cognitive development.

Since the perceptual interpretations of this High Risk child may be faulty or variable, the use of this curricula is beneficial in providing this child with experiences which ameliorate his misperceptions. Without accurate discrimination information he will be handicapped in categorizing

and classifying his world. With increased perceptual discrimination he may move to these levels and be better prepared to move toward reasoning skills.

In a Montessori environment many activities prepare a child for reading and writing. The language curriculum consists of oral language, pre-writing activities, pre-reading activities, such as word building, which lead to reading and writing. (Table III)

Oral language precedes written language. Correct speech and pronunciation are essential tools for reading. During a child's first year of life, as he proceeds through crying, cooing, babbling, echoing and eventually the first production of meaningful words he is developing an "inner language", an understanding of vocabulary that he is not yet ready to express. A child spends the second year of his 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 and discussion of the attributes and the functions of this material and in the narratives between the teacher and the child and the child and other children in the room.

Preparation for writing begins with the metal insets. These are metal frames with removable centers in various geometric shapes. The child by tracing the shape and eventually shading the internal part of the design is practicing all the essential movements he will use in writing.

The first step a child take toward reading is the multisensory exercise of tracing the sandpaper letters. As he traces the letter the child repeats the name and sound of the letter. In this way the child feels the shape with his finger, feels the shape with his arm muscles, sees the letter and hears the sound. When a child begins to recognize sounds he begins identifying sounds in words. Many matching activities are created for the child to practice this essential skill.

Through the tactile kinesthetic feedback in using the sandpaper letters the child begins to practice writing the symbols. The child moves through writing to reading.

When a child begins blending sounds together he is ready for word building with the movable alphabet. The movable alphabet is 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. The 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 sets a foundation for comprehension.

As a child's skills in word building increase he is offered reading booklets, the opportunity to copy words and then sentences. He proceeds at

his pace to more complex levels of reading, spelling and writing. Sight words are introduced in a variety of materials.

Grammar is presented in a unique system in which each part of speech is represented by a geometric symbol. With these symbols placed under the words of a sentence, sentence patterns can be represented graphically.

The High Risk child is assisted by these procedures in many ways. Oral language builds through repeated exposure to objects and ideas which are precisely labeled and consistently used by his teacher and reinforced by the child in the environment. The Sandpaper Letters allow the High Risk child to learn through 4 senses instead of the usual 2 (visual/auditory) which may be inefficient in the processing task. The moveable alphabet allows a child who is not yet "good at writing" to practice the patterns of the language with manipulative materials. Most importantly these patterns can be controlled for him so that the number and diversity of patterns does not overwhelm this child with visual/auditory processing deficiencies. All work proceeds at his rate. Cursive writing with its flow and constant left to right directionality and consistent spacing is helpful to the High Risk child.

The sensorial materials are a pre-requisite to the mathematics curricula. The child learns to discriminate greater than and less than through varying size dimensions, in the sensorial curricula, before beginning to deal with the more abstract concept as it relates to relative quantities which are represented by numerals.

The mathematics curricula includes a hierarchical study of numeration, linear counting, skip counting, the place value system, the arithmetical operations, memorizations of facts, powers of numbers, materials leading to abstraction and other base systems. (Table IV) Each concept is presented to the student with the carefully designed manipulative materials. These materials introduce to the child quantities, mathematical patterns and relationships.

The child is introduced to the numbers from 0 to 10 through a series of activities which vary in level of difficulty. One example of an activity is the Red and Blue rods which are 10 rods varying in length from 10 cm. to 100 cm. they are arranged in a stair-like formation. Each rod represents a number from 1 to 10. The teacher helps the child count the alternating red and blue sections of each rod. After the child has experienced and mastered the activities related to quantities from 0 to 10, he is introduced to the teens (11-19). About the same time the child is introduced to the same decimal system where he experiences the concept of units, tens, hundreds and thousands.

A single bead is a unit, a bar made of ten units is a ten, ten of the ten bars fastened together form a square which represents a hundred and a group of ten hundreds forms a cube which is a thousand.

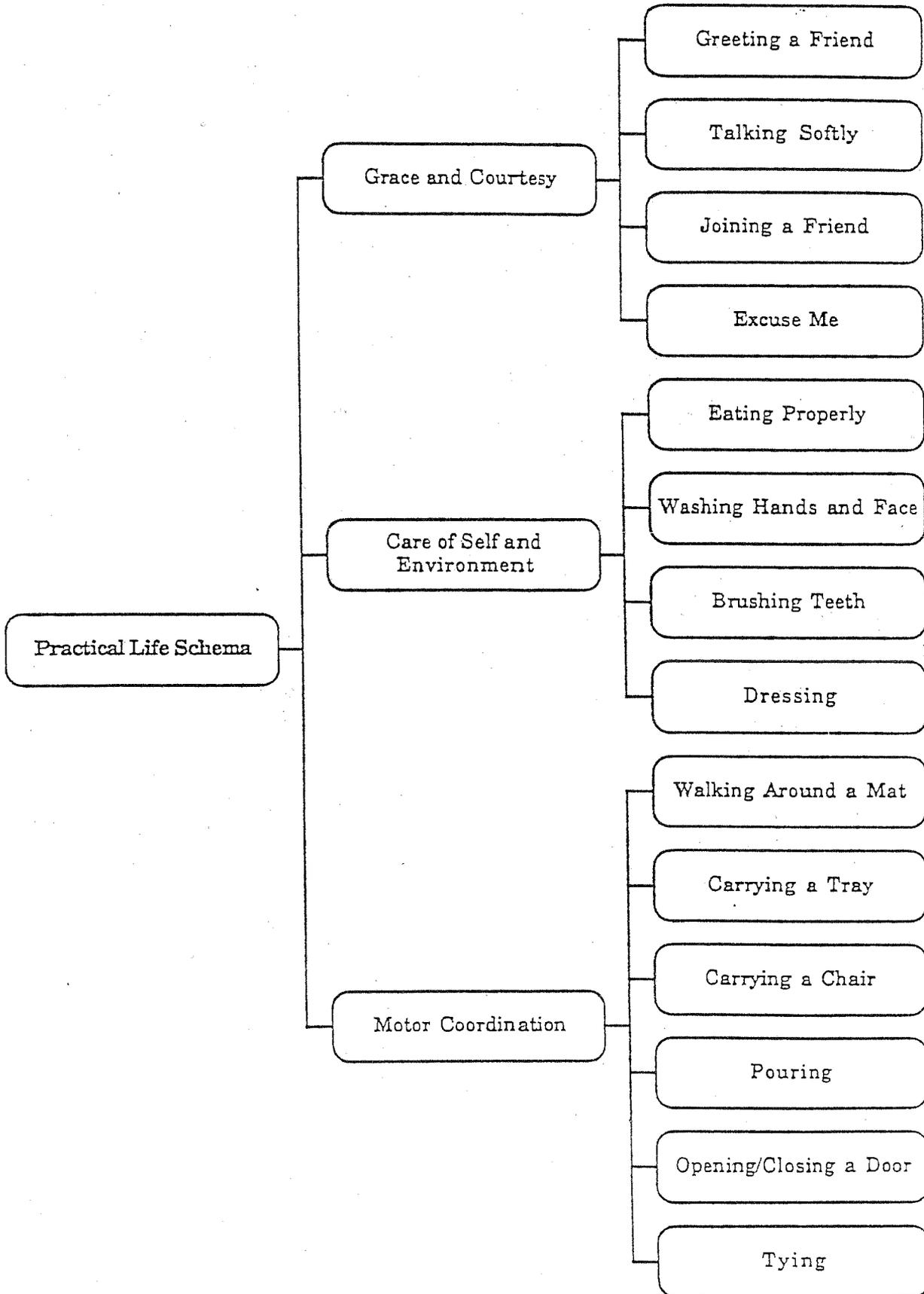


TABLE I

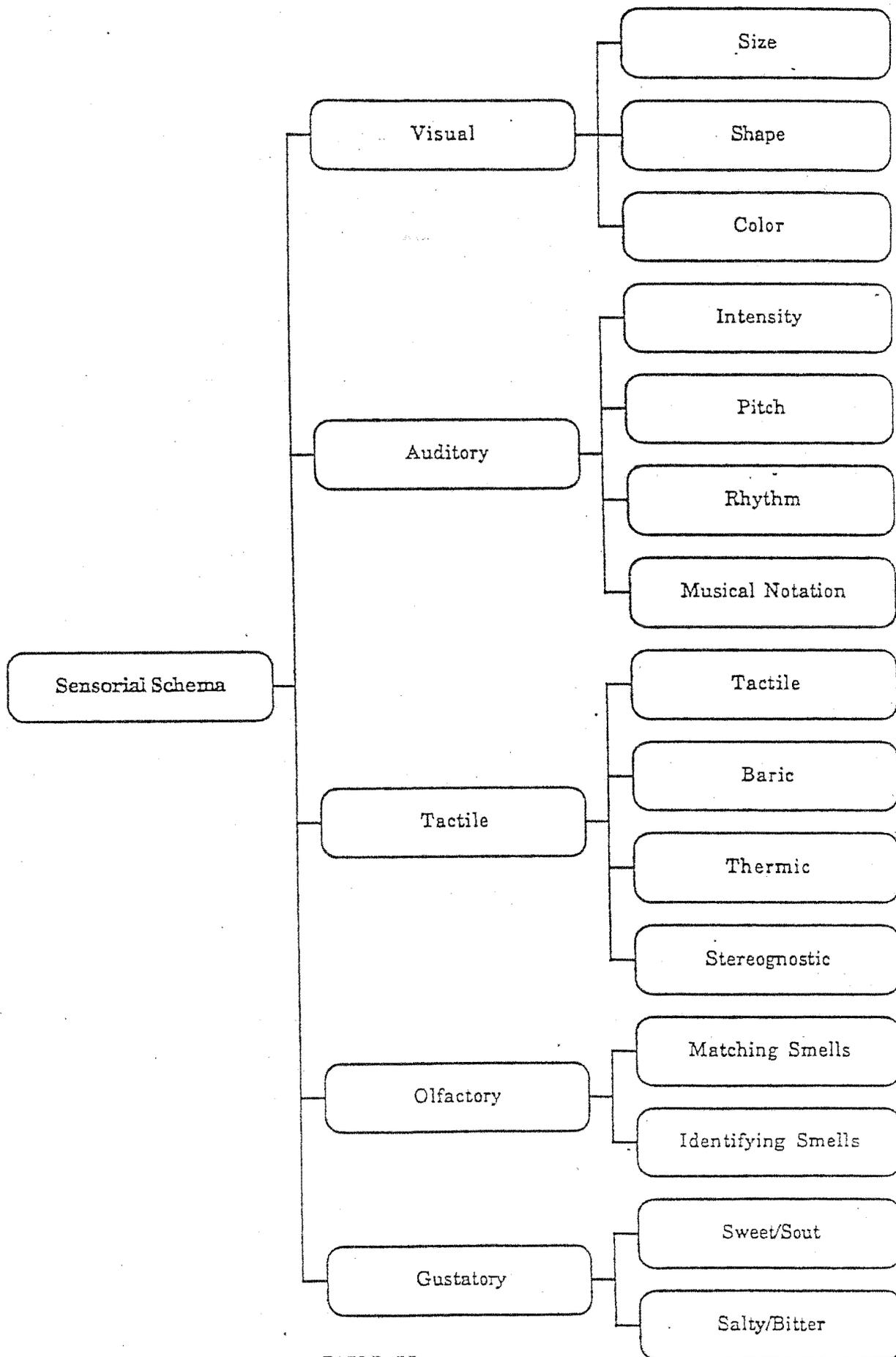


TABLE II

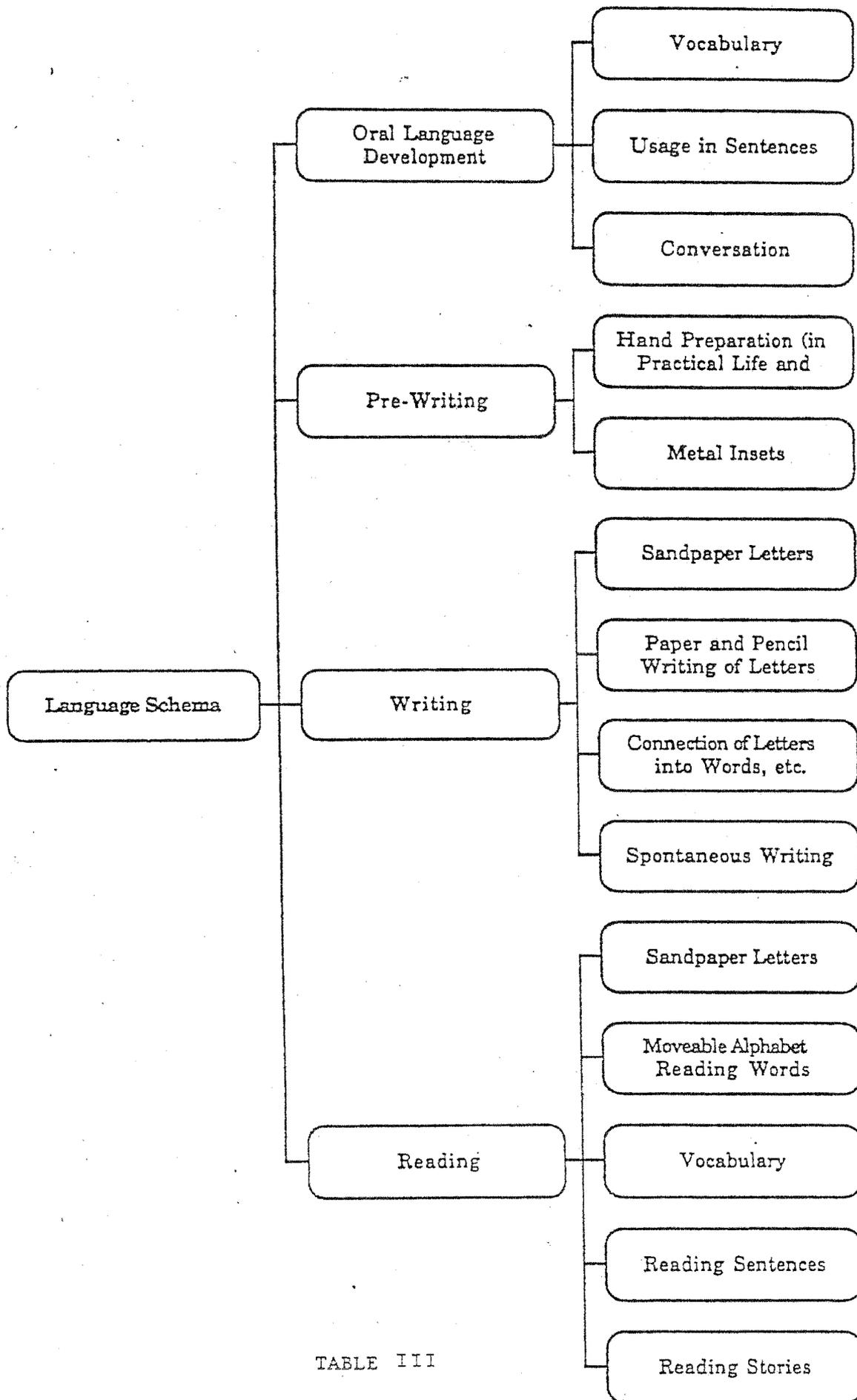


TABLE III

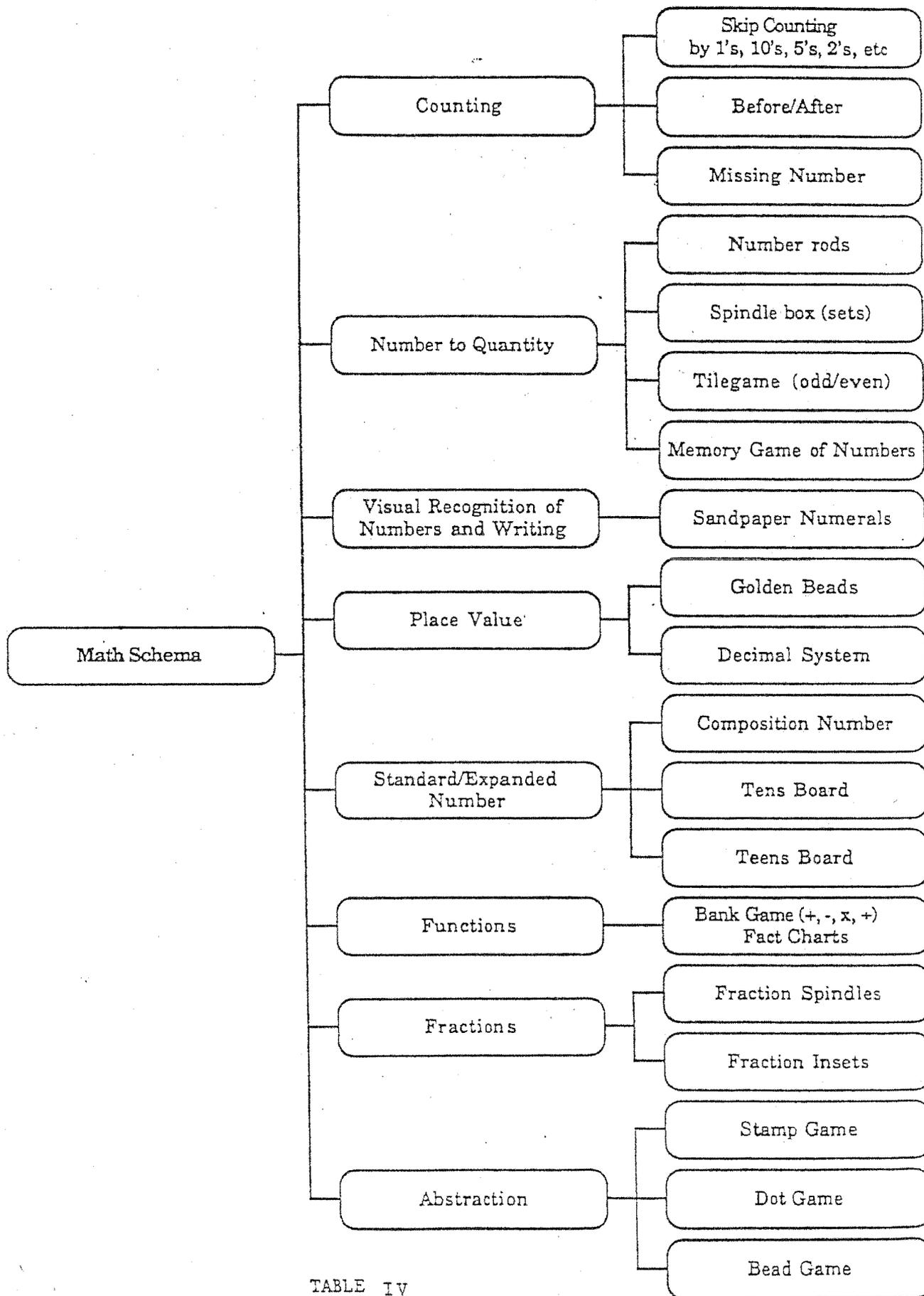


TABLE IV

The child is also introduced to "Linear Counting." The one hundred chain, for example, shows how the hundred square would look if its beads were laid in a single row. The chain, which is actually made of ten ten bars, is used as an exercise in counting by tens up to 100 and it is also to show that the square of ten is one hundred. The complete bead material shows the square and cube of all numbers from 1 to 10.

Later in the program the child is introduced to the concept of the 4 basic operations (addition, subtraction, multiplication and division) using this same bead material.

For all students the use of this material demonstrates patterns and functions in mathematics in a 3 dimensional model. The mathematically gifted seem to be able to visualize this model abstractly, but most students benefit from these procedures by understanding math relationships more clearly. This is certainly true for the High Risk child, who often has many weaknesses in abstract reasoning.

### **Contrast of the Average and High Risk Learner**

The following narrative will contrast the average and High Risk child in the areas of attention, organization, motor skills, visual/auditory perception, language and mathematics acquisition. (Table V summarizes these observations) A discussion of the ways in which Montessori is observed to enhance these areas for the High Risk child is presented.

#### ***ATTENTION***

\* In the normal child, inhibition proceeds to develop so that by 3 years of age the child has the ability to filter out extraneous sights and sounds. Attention, focus and concentration are functional for learning.

\* In the High Risk children, this development does not proceed normally and the child must be taught to attend. The teacher must help the child reach a level of attention that is within the learning range and she must use techniques during her presentations to help him maintain it. She has to help him learn to make choices or he may wander and do little meaningful work. The techniques for focusing attention are found in Montessori's classroom structure, presentation procedures and in the silence game.

To create the classroom structure, the teacher prepares a beautiful and well-ordered environment for the class to explore with her guidance. Each presentation is set up on a separate tray. Each tray is placed on a shelf. Each group of shelves defines an area of curriculum.

All language activities are grouped in an order of difficulty on shelves in one area of the room. Within this area there may be the structured language activities, a reading corner, a listening center, a record player with

earphones and possibly activities with a typewriter and a computer. In the math area, the activities are arranged in a hierarchy of difficulty, so the child is assisted in finding the materials on his level. The independent usage of each of these activities have been carefully presented, then the child is encouraged to bring his unique creative talents to his work.

The teacher is a calm supportive person who waits for the child to understand or finish his work. She requires that he wait when it is her turn to present, and she does not interrupt him when it is his turn. She requires that he learn to inhibit his actions as appropriate for living in a group. He must at times wait for her while she works with others.

The room is a relatively quiet place with the hum of work sounds. Children are helped to be aware of sound levels and help return the level to a work level, if sound becomes too distracting. The teacher usually talks in a clear, quiet voice close to the child to whom she is speaking and on his level so he can see her mouth. She usually does not talk across the room and asks that the children come to her or to each other to converse rather than yell across a distance.

Young children seem to feel secure in this environment of ordered calm and are usually very cooperative in modeling their behavior on the teachers. The environment is far from barren, but it is orderly and limited in distraction and helps the child focus his attention on each work task.

The procedures of the presentation of materials provides the child with the security of a clear structure or way to proceed in learning. Attention is focused as the child watches a presentation for its steps and conclusion.

When the child requests or when the teacher determines a child is ready for a certain presentation, she invites the child or more than one child to join her either at a small table or at a mat placed in an area on the carpet. Part of every presentation is 1. setting up the work area, 2. selecting the activity, 3. usage of the materials (basic/extensions), and 4. return of the material to the shelf.

In preparing the work area a mat is used to delineate the child's area of work. No one may disturb his work or join him unless he gives permission. The children are shown how to walk around these mats on the floor, how to respect others work, and how to ask if they may join another in his work. The child is shown how to get materials from the shelf. Some activities are all on one tray and can be moved easily from the shelf to the mat. Others have numerous pieces and require repeated trips to and from the shelf. These trips carrying materials of various size and weight, help the child to develop body control and to improve inhibition/initiation of motor movements. To accomplish the tasks of setting up the work area and obtaining the materials, attention is focused and refocused on the work area and the material.

When the material is on the mat the teacher calls the attention of the child/children saying "Look." She waits for focused attention in each child. She gives time for his concentration to begin.

During the first presentation she usually does not distract the child from the visual input by any verbalization. She uses slow hand movements in which she analyzes for the child each step of the motor movements required for the task. She does not present the motor movements in a rapid flow as an adult usually does them. Attention generally stays focused once attained, but if it does not she may stop her hands in mid-motion, say the child's name, and/or say "Look." She will do this as often as necessary for the child to "see" the whole presentation.

After her presentation she says to the child "your turn." She observes. She notes attention, order, percept, concept. She notes what the child understands and what he cannot yet do. These notes will lead her to further presentations. She uses the time after his turn to discuss the work and attach language concepts to his visual/tactile/kinesthetic perceptions of his exploration of the material.

After he has completed the exercise, she shows him the steps for returning the work to the shelves or area of the room where it belongs. Many of these areas or shelves are marked with symbols which match symbols on the materials. These symbols assist the child in finding for himself where things go. They also direct his attention in this final step of each work he does.

In all 4 steps of each presentation attention is required. The presentation procedure helps the child with attention difficulties to focus through the teacher's physical presence and movement, the high-demand quality of the materials, and possibly by the human desire for closure.

The Silence Game is an exercise in which the child is given the opportunity to practice self control and focus of attention. The children are invited to sit on the line. The line is a tape placed on the carpet in a rectangle or oval shape large enough that the entire class can sit cross-legged on it. As work time nears a close the teacher may turn down/off the lights or ring a small bell which is the signal to put away work and come to the line for some group activity. As the children come the teacher may begin reading a story, singing songs or using finger plays or motor activity on the line. When the entire group is present there may be a quiet discussion of some of the work they chose during the morning. The teacher slowly brings the class tension level down by talking quietly and slowly. She announces to the class they may now play the "Silence Game". The point of the game is to see how long the children can maintain silence with no talking or movement. The teacher asks for all children to cross their legs, sit up very straight, place their hands on their knees. At a signal from her the game starts. The class may use a clock, kitchen timer, or sand timer to see how

many seconds or minutes they can "make silence." Many classes make it only for a second or two at the beginning of a year but may extend to 5-10 minutes or longer by the end of a year. As meditators know, the longer the silence is maintained the deeper the calm felt by each child. For all children the purpose of this activity is to inhibit motor movement, to increase concentration skills, to focus attention on a task. For the High Risk child, this experience may be one of the first times he has felt "quiet" within himself or really attended/concentrated. He can do it, but not easily. With practice and help he can enhance this skill and transfer it to periods of work and to the inhibitions necessary for behavioral control. Even if it is hard for them, children seem to love this game.

Attention then, is enhanced in the Montessori method through the structure of the classroom procedures, the presentation procedures, and the silence game. The teacher accepts as her role the teaching of inhibition; helping the child to learn to wait for his turn, to know how to walk slowly, to talk in a quiet voice and to control his body and behavior in a work environment.

### *MOTOR SKILLS*

\* The child's whose motor skill development proceeds through normal stages has developed the gross motor skills of running, jumping in place, walking on tiptoe, kicking a ball forward, and throwing a ball by three years of age and by five can walk on a line forward and backward, balance on one foot for 5 seconds, hop on one foot, throw a ball with direction, walk up/down stairs alternating feet and turn a somersault. He is beginning to learn to skip and jump rope. Fine motor skill development has proceeded from turning pages singly, snipping with scissors, holding crayon with thumb and fingers, not first, using one hand consistently, and making circular, vertical, and horizontal strokes at 3 years of age to cutting continuously on a line, copying a cross, circle, square and copying letters at 5 years old.

\* The High Risk child often has not proceeded through the milestones found in normal development or is seen to have a spotty performance. In gross motor skills the high risk child may be much later in acquiring control of his large muscle movements. At seven he may still have difficulty with the alternating activity of skipping. He may have difficulty in fine motor skills which can be seen in tying, pouring, handling utensils, cutting, coloring and later in writing.

In all areas of the Montessori curriculum the child is shown and helped to co-ordinate his gross motor movements: the action of carrying materials of varying size and weight; the activities "on the line" the children move to rhythm, march, hop and skip to various rhythmical patterns and

music. Most Montessori schools have a full perceptual motor program done partly in class and partly outdoors.

Exercise in every area help the child to practice eye-hand coordination. From the Practical Life Activities of the dressing frames, cutting carrots, and polishing silver to each Sensorial, Language and Math work the procedure requires the eye and hand to work together. In each of these activities the child handles the didactic materials which require that the coordination of the hand and particularly the thumb, index and middle fingers work together for appropriate grasp and release. These are the fingers that will later be used in writing.

A specific activity for strengthening the writing skills are the Metal Insets. In this set of 10 metal frames and insets are the basic geometric shapes. The child is shown how to trace the shape with one color and fill in the shape with a contrasting color. Precise small motor movements are practiced until the child's pencil grasp and pressure are improved to the limit of his ability.

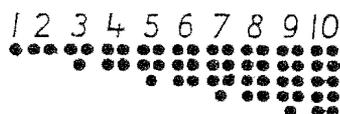
### *ORDER AND ORGANIZATION*

\* Most children appear to learn order and sequence almost totally by imitation. If learning tasks are presented to the child in a specific order and sequence he will imitate and develop these habits, especially if the presentations are begun when he is in the sensitive period for order at about 2-3 years of age.

\* High Risk children even with the same exposure to organization as the average child evidence difficulty with ordering work tasks and working in a sequential way. This child often begins a task as it was presented to him but appears to lose the pattern as he goes and often drifts through a task in a haphazard trial and error procedure usually seen in a child younger than five. The complaint most frequently seen on the school cumulative folders of learning disabled children are in relation to their poor organizational skills and they are usually described as immature.

As has been described all the activities are designed to assist the child in developing organizational skills and habits of completing tasks in a sequence.

The High Risk child needs more presentations and direct instruction in organization. For example, in the math activity of the Tile Game, the numerals 1 to 10 are laid out along the top of a mat. Under each numeral the quantity is matched to the numeral by means of placing small red disks in a pattern. The pattern is



After the child understands the number to quantity concept, the odd/even concept can be demonstrated by counting while pointing to the bottom of each set of disks; odd even, odd, even, etc. The visual pattern that is seen is that "odd" numbers have 1 disk left by itself while the "even" numbers are even with nothing left over. High Risk children may need for the teacher to provide an additional step to help them organize the pieces of this activity. The teacher may make a control paper on which there are red rectangles indicating the location to place the numerals and black rectangles under the numerals indicating the space allocated for placing the disks. After using the control chart for a time the teacher will challenge the child to try the activity without the control chart or to use it only when they need it. Such techniques help the child develop organizational skills and keep him feeling successful rather than confused.

### *PERCEPTION*

\* The average child in the Montessori classroom is able to match and discriminate sensory information that relates to the visual perception of size, shape, color; the auditory input of pitch, rhythm, and intensity of sound; the feel of texture, weight, temperature, shape; the taste of sweet, sour, salty and bitter; and the sense of smell. He perceives patterns in shape, color, and number.

\* The High Risk child frequently can match within normal limits. However, difficulty is sometime seen in the discrimination of sensory information. Discrimination and memory weaknesses for math and or letter symbols are usually seen. Association of a symbol to a name is often a problem. These children often react to stimuli in either of two directly opposite ways. Sometimes they seem to be unaware of the sensory stimuli and at other times they are perceiving it with such force that it is very agitating to them. For example, one child sits at lunch day after day with milk around his mouth and never wipes it away. He does not seem to have any sense that it is there. If asked to wipe his mouth he will do so, but not unless trained to do it regularly does he develop the habit that most children do because they feel the substance on their upper lip. Another child reacts very strongly to anything on his face, or any touch that most children would not notice. A shirt that is not really soft, might be perceived by this child as unbearably scratchy. Some High Risk children often choose only black to use in drawing or coloring. They may not note differences in color, even though they are not usually color blind, and they do poorly with shading activities. Another child may be very sensitive to color. This child has great difficulty inhibiting the irritating colors in his environment. What seems to be significant is the over and under reaction to sensory stimuli.

A child learns through his 5 senses of sight, hearing, feel; smell and taste. The eyes, ears, skin, nose and tongue bring sensory impressions to the brain where this information is interpreted. This process of interpretation of sensory input is perception.

In High Risk children the processing of sensorial information may be different. Dr. Montessori did not assume with any child that he would perceive the differences in quality that are the primary colors, red, blue, and yellow. She developed a visual activity that isolates the quality of color so that the child may match like colors. The size, shape, texture of the activity does not vary, only the color of each color tablet is different. If the child is seen to perceive the primary colors; the secondary color box is presented including green, purple, orange, brown, black, white, gray, pink, purple. If the child can match these color qualities, the language is also surveyed. If at any point the child cannot be successful at the perceptual or conceptual level, the teacher notes the problem and plans specific presentations on these weaknesses.

The third color box has 9 basic colors and each color has 7 shades. Here the teacher can observe if the child perceives the shades in gradation and has the comparative and superlative language of darker/lighter, darkest/lightest. If he does not perceive shades, she limits the number of shading tablets to 2 or 3 reducing the difficulty of the task until mastery and then increasing the number of shades to 5 and possibly 7.

In all the Sensorial Curriculum the teacher helps the child to classify his world through his 5 senses and to attach the language concepts which express those perceptions. (See Table II for an outline of the Sensorial Curriculum.)

These perceptions are also seen as pre-requisites critical for higher academic learning tasks such as mathematics. For example the Sensorial Curriculum contains activities which allow the child to discriminate and gradate size dimensions. If the child cannot perceive that one cube in a series of 10 is larger or smaller than the next, he could not perceive the more abstract mathematics concept of greater than or less than. A child who cannot gradate the 10 cubes of the Pink Tower is not "ready" for math concepts. Likewise, the child who has difficulty perceiving basic shapes is not "ready" for the discrimination of the language symbols a and o. The Montessori teacher has many readiness markers in the Sensorial Curriculum to help her determine which materials are appropriate for a child at a given time.

For the High Risk child it is to be critical to present carefully all of the Sensorial materials, being alert for gaps in concept formation and directly teaching these percepts/concepts in small steps for mastery. In this way a foundation is prepared for later complex perceptions of math and language patterns.

## *ORGANIZATION OF WORK (CHOICE /HABITS/CYCLE)*

\* The average child chooses his work appropriately a majority of the time, usually asks the teacher for progressively more difficult presentations, practices activities for mastery, learns many concepts through discovery, and chooses one activity after another in his work cycle in the classroom.

\* High Risk children often wander the room not choosing work, or choosing work only to replace it without doing the activity. They usually avoid the areas of the curriculum they know are difficult for them, rarely asking for more difficult concepts but rather repeating work they have mastered successfully.

These children need the teacher in their environment a much greater percentage of the time. They need support, encouragement, and assistance in most organizational tasks even those of a simple nature. They need the teacher to guide more of their work choices using her observations of their development to guide her selection.

Most children in a class maintain a flow of work with a minimum of teacher direction. High risk children frequently do need their teachers to "limit the choices". Thus, the teacher may direct the child to choose any item in a certain area of the room, to select an item from a particular shelf, to choose between two specific items, or to select the materials for the child. When children have severe problems and/or attentional deficits it is sometimes necessary to make most of the selections for the child. In some cases a card file is constructed, with pictures of the materials for his use that day. After he completes an activity the child can place the card at the back of his file and chooses the one at the front. This device helps the child learn how to choose. Soon he will ask to put some of his own choices before the ones in his file or change the order, a sign of real progress in selecting his own work. Ideally he will work progressively more independently until this training technique is no longer.

## *DISCOVERY LEARNING*

\* The average child has a natural curiosity which seems to draw him to the shelf to investigate a new idea. He has an attention span and perseverance which is beyond the expectation of most adults. He frequently figures out the answer to a new concept by interacting with a didactic material. His reaction to this discovery is a delight that Montessori called "Joy."

\* The High Risk child exhibiting attentional differences and perceptual confusions experiences much less discovery learning. If the information being processed is perceived incorrectly, it is difficult to

impossible to draw a correct conclusion and "discover" an answer or concept. He needs direct teaching techniques most of the time, but still benefits greatly from the didactic materials which bring abstractions to a more concrete level of conception. He requires more presentations of each material as a rule, as the teacher usually has to limit each presentation to one level of the concept or one "point of interest." She also may have to reduce the presentation to a small number of items to be handled and understood.

One of the most significant benefits observed in High Risk children interacting with self-corrective materials is that they can learn to accept that mistakes are not "bad," but the way we learn. This concept is verbalized by the teacher as well. "How do you think you can do it?" "Try." "It's okay if it's wrong, then you can try it another way." "If we can't figure it out today maybe we can tomorrow."

This experience seems to minimize the High Risk child's usual reaction to something he tries and can't do. Feelings of frustration, anger, a tendency to give up or do it as fast as possible, or cheat, or avoid a difficult task are not necessary when the child is taught that patience and perseverance are often necessary for learning and that the process is as or more important than the finished product. The important thing is what we learn, not that we did it perfect the first time or finished first. The group learns to respect another's learning experience. They learn it's his turn, we will wait for him to think, we will allow him to do it wrong and not rush him or laugh at him. The teacher absolutely insists on this respect for each human being in her class and is the model for this behavior.

### *ORAL LANGUAGE*

\* The average 5 year old has developed a vocabulary of 2,500-5,000 words and can use this vocabulary to express his needs, wants, and ideas in a basic communication which is at the level it will be as an adult. More sophisticated vocabulary and expression will be mastered but basic communication skills are present as the child enters first grade.

\* The High Risk child may or may not have oral language disorders. Some high risk children are very verbal have a large vocabulary and never evidence problems of oral language. Their first frustrating experiences come with written language. Those High Risk children who do have oral language deficits will exhibit weaknesses in vocabulary and verbal expression. Articulation problems are often present in both the verbal group and the group with expression problems. Auditory discrimination and memory problems are frequently seen.

The child who does not perceive the "sounds" of language accurately may not have only an articulation problem but may have a limited vocabulary and difficulty expressing himself in sentences and conversation.

The Montessori system proves ideal for the Language Disordered child or an English/Second Language student. All presentations are made first without language. The child may attend visually and observe the materials presented. After he is successful at perceiving the sensory information of the presentation, then language is attached to the precept and a concept is formed.

Each activity in each area of the curriculum gives stress to the input and comprehension of sensorial information leading to a perception; and then emphasizes the attachment of language to provide the child with the concept and the ability to express himself concerning the attributes and functions connected with the concept.

For example after the child builds the pink tower gradating it from largest to smallest, the teacher asks the child to take it down. She moves all the cubes except the largest and smallest to the side of the mat. The teacher presents a 3-period lesson.

1st period This is big. This is little.

2nd period Show me big. Show me little.

3rd period What is this? What is this?

At any point, if the child cannot respond the teacher returns to the first period.

The three period lesson originally suggested by Seguin takes the child through the normal language development stages of Identity, Recognition and Recall. In the Identity stage the teacher verbally labels the object for the child, at the Recognition stage she assesses receptive language (does the child know it if she names it), and at the recall level she checks the child's expressive language (can the child remember the label and give it verbally). For each child this process varies in length; some moving through all three immediately and other working at the first and/or second stage for longer periods of time. This careful presentation of Identity-Recognition-Recall allows the child to expand his vocabulary and expression and become ever more precise in his communication.

In Montessori's presentation the exact language for an object or idea is always used with the child, never a simplified label. A sphere for example is called a sphere, not a ball. Children between birth and 5 are in a sensitive period for the acquisition of language, and 18 months to 3 years of age is a particularly critical time. Therefore it is important that an accurate vocabulary be offered to the child.

Though children with Language Disorders are seen to benefit from Montessori's procedures in relation to oral language development, they come to pre-school with much of the oral language development expected of a 3 year old incomplete. For that reason the teacher must become therapist; "filling in" the language gaps in even the most basic vocabulary areas.

Syntax forms are modeled through the sentence structures until they are automatic and can be used in spontaneous speech. The procedure of moving from vocabulary to sentence form to spontaneous speech becomes an emphasis with the teacher in all her presentations to language disordered children. The remediation of language deficits must be done in direct teaching procedures, repeated until automaticity is achieved. Indirect teaching of the same vocabulary and sentence structure may be reinforced through shelf activities.

### *WRITTEN LANGUAGE*

\* Children with normal auditory and visual perceptual skills learn the sounds of the English language during their pre-school and kindergarten years if they are exposed to them. Many can blend sounds and begin to decode words and some read quite effectively if just exposed to the patterns of the language in some organized and sequential way. A few linguistically talented children can read at the second or third grade level when they enter the first grade.

The performance of the High Risk child with perceptual deficits or immaturities tends to be variable. These children tend to avoid any work that is connected to the symbols of language and their sounds. When these are presented as choices they are ignored completely. When they are presented as direct teaching lessons the child who is High Risk evidences difficulty maintaining sound/symbol relationships, faulty ability to perceive word patterns, weaknesses in blending sounds into words, and slow and labored decoding skills. An understanding of the specific deficits of the High Risk child is necessary for the teacher to apply the Montessori's language program to this student.

As examples of the specific strengths of the Montessori written language curriculum in relation to High Risk students, the three beginning language presentations will be described. Letter sounds are introduced with the sandpaper letters. The child learns to trace over the sandpaper letter as he says the letter's sound. The procedure is visual-auditory-kinesthetic and tactile. Children who evidence no problem with the symbols love to work with the sandpaper letters and to play with them until they know the sound-symbol association. These children may choose the letters in any order. They move easily to the activity in the next level of difficulty, the sound boxes.

The sound box is a small box containing objects or pictures and two letters. The procedure involves the discrimination of the two beginning sounds.

As the child becomes automatic on the sounds at the beginning, ending and middle of words he indicates readiness for the next activity, the

movable alphabet, letters cut out of cardboard. The vowels are blue and the consonants red. The child chooses a picture and then sounds out the word, selecting the symbol for each sound he hears. He places the letters next to the pictures which are arranged on a mat. He can check to see if he has constructed the word correctly by turning over the picture card to see the correct order of the letter sounds in the word.

By this time the average student is copying the sandpaper letters in various writing activities and often spontaneously begins to copy the words he constructs in the movable alphabet activity. From word building of CVC short vowel words, the presentation proceeds to long vowel patterns including all of the phonograms of the English language, then from regular to irregular patterns (including sight words) of the English language.

High Risk children require that the sandpaper letters be presented directly in a logical order for structured word building. For example, the average child may work with the movable alphabet building words with all 5 short vowel sounds easily, while the High Risk child needs the teacher in very specific presentations to help him master the "short a" CVC pattern before presenting another vowel sound.

He will generally need longer and more direct work with the teacher on the sandpaper letters and the sound boxes before he attains mastery and can apply this knowledge to word building. Since sound blending is often a marked deficit for the High Risk child the word building may proceed much more slowly and it is necessary to structure the presentations of the language much more precisely from simple to complex than is necessary for the average child. For example, the order of selection of the phonograms for the average child may be quite random while the order for the high risk child is best modeled on the order of the Orton-Gillingham method, the Shedd APSL method, or the dePaul Phonetic Structured Linguistic program. For High Risk children with blending difficulties presenting a word family model is seen to be more effective. The child may blend a beginning sound to a word family instead of each letter sound by sound.

The child moves in the language curriculum from word building to sentence building to reading/writing stories and books, to grammar analysis.

Each new concept can be presented in a multi-sensory, hierarchical, procedure matched to the child's level. Each activity can be broken into reduced levels of difficulty or increased levels of abstraction as fits the student. For this reason the High Risk child may move more slowly than another child, but he will not know complete confusion.

## *MATHEMATICS*

The average child chooses a variety of math activities moving from the simpler to the more complex materials. He frequently asks the teacher

"What comes next," "What is harder?" He learns the number to quantity concept, the concept of zero, the odd and even numbers, attaching the numeral to the quantity, easily remembering the symbol and learning to write it with little difficulty. He perceives the pattern of odd and even, and skip counting. Through the use of the manipulative material he moves from concrete to abstract concepts.

\* The High Risk child has difficulty with the attachment of symbol to quantity, the visual memory of the symbol, learning to write the symbol, one-to-one correspondence in counting, perceiving math patterns in writing from 1-100, skip counting and odd and even numbers. He may understand complex concepts of the decimal system, place value activity but show perceptual confusions in the layout of the ones, tens, hundred and thousands. Some master easily the concepts of addition, multiplication and subtraction but evidence perceptual confusions with the written work of facts. He misperceives the signs and loses his pattern within a given function. For example, in the middle of an addition problem he may change to subtraction. He also has errors in spatial placement of numerals when copying a problem, not lining up numerals correctly. He often has problems with immediate recall of number facts and so confuses his answer and misses a problem on one test he has answered correctly on many others. Another group of High Risk children have these confusions plus difficulties in grasping mathematical concepts.

As in the language curriculum the matching of presentation to the child's developmental level and the manipulative materials which concretize the concept for the child are factors which help the child maximize his mathematical understanding.

The first activity in the Montessori Math curriculum is the number rods, designed to assist the child in associating a numeral to a quantity. The number rods are 10 rods which increase in length, the shortest rod being 10 cm. and painted red. The second rod is 20 cm. and half (10 cm.) is red, half blue. The rods continue to increase in length and the number of red and blue sections up to 10 which is 100 cm. in length. The child is presented the number rods after he has an understanding of the Red Rods of the Sensorial Curriculum, with which he explored the size dimensions of length from short to long.

In demonstrating the procedure, the teacher orders the rods from shortest to longest, as she had done with the Red Rods. She then puts the rods back in random order and the child takes his turn. She observes. When the child can order all 10 rods correctly she continues to the next step.

In proceeding, the teacher chooses the first and second rod. She says "this is one" and holds the one rod at each end. Then, holding the two rod in that manner, she says "this is two." She will ask the child to show her 1 and then 2. She will then ask "What is this?" pointing to one of the rods and

then the other. When the child can do all of the steps of the 3 period lesson she will proceed to do a 3 period lesson with the 2 and 3 rod and so on.

When the child has the verbal label attached to each quantity the teacher will introduce the mathematical symbols for the verbal labels. Removing the rods from the mat she places a wooden card with the numeral 1 and another with 2 on the mat. She proceeds through the 3 period lesson until in that or as many succeeding presentations as necessary the child can recognize and say the name when he sees the numeral.

At this time the number rods and the numerals are matched together, first out of order and then in sequence. A rod is placed on the mat and the child matches the corresponding numeral to the quantity. When he can do this easily, automatically, he is asked to order the rods and then place the proper numeral at the end of each rod. Usually at the same time as this introduction to numerals is beginning, the Sandpaper Numerals are also being presented. In this activity as in the Sandpaper Letters the child traces the numeral with his finger while saying its name.

It can be seen in this sequential presentation of the numeral/quantity concept that the High Risk child may proceed through a hierarchy of complexity, proceed at his own rate, works with the number of items he can handle, has a multi-sensory learning experience of visual-auditory kinesthetic and tactile interaction with a material which, demonstrates a concept, may have repeated practice.

One child within a class may proceed through all of the steps in one lesson, another may take many months to understand and master number to quantity. In the Montessori setting he is helped to progress and feel successful while moving at his rate of learning proficiency.

General observation of High Risk children in a Montessori program indicates that these children need the teacher present in their learning environment for greater time periods, direct assistance on attention/focus/and concentration, structure for behavior, guidance in selecting and performing tasks, specific and direct oral language development, direct teaching of written language and/or math symbols, pre-writing and writing practice with a multi-sensorial technique, and language presentations modified with the techniques or programs for children with specific reading disabilities.

### Summary And Conclusions

The Montessori Method enhances the development of attention, order and organization, gross and fine motor skills, visual and auditory perception, oral language development, the academic skills of written language, and mathematics, and personality growth. It accomplishes this enhancement through a hierarchical curriculum which a trained and skillful teacher may,

by observation, match to the child's developmental level. The program enables the child to feel successful in school and therefore attain a concept of himself as a competent person. The method provides this enhancement through:

- \* a classroom structure which provides a method for individualization of instruction through the child's interaction with the didactic materials proceeding at his own rate for mastery
- \* specific procedures/techniques for training attention a classroom structure, clear in limits and privileges, which assists the child with inhibition control to develop those skills
- \* an emphasis on work organization which gives a child a model for learning how to set up and go about work tasks, the result of which can be a lifelong habit of investigation
- \* manipulative materials which provide the child with multi-sensory perceptions which help concretize abstract concepts
- \* specific techniques for increasing gross motor skill development, eye-hand coordination and fine motor skill facility
- \* a concentration on the specific labels for people, objects, and ideas and their attributes and functions which foster oral language development
- \* presentations of academic skills in small sequential steps with scientifically researched materials to further skill development in language, math, geography, history, physical and biological sciences, art and music
- \* an environment of encouragement to try, a de-emphasis of failure, which encourages the child's desire to be independent, an emphasis on respecting the teacher and classmates which fosters consideration for others.

J. McVicker Hunt has written that Montessori has come the closest to solving the problem of "match" in education. (Hunt 1968) He explains the "match" concept as placing the level of presentation to the child at the child's developmental and skill level for optimal learning and success. This problem of "match" is critical to teaching the High Risk child.

An important observation the author has made during these studies is that the major motivation for learning is success. Through the Montessori method, minute levels of difficulty in a task can be matched to the child's ability level. Therefore, these presentations can be structured for success. The child can feel some positive feedback. Frustrate this already confused child and in a short time secondary emotional problems such as hostility, bullying, bossiness, and/or withdrawal begin to appear.

Data collection throughout the more than 20 years of applying Montessori to students at High Risk indicate that these students scored effectively on standardized measures appropriate for their age. Observation gave a view of an infinitely more important result. These High Risk children enjoyed school and learning. They and their classmates accepted their differences in their weak areas. Their self-concept of themselves as a learner and a person remained intact.

## Contrast of the Development of Average and At Risk child Related to the Montessori Methods which Enhance Learning for the At Risk Child

### Development of Average Child

#### ATTENTION

Inhibition control begins to develop at 2 1/2 to 3 years of age. Focuses on activity presentation and concentrates. Works with activities for periods of 10 minutes or longer.

#### COORDINATION GROSS MOTOR

Walks, hops, runs, jumps, skips, throws and catches ball by approximately 5 years of age.

#### FINE MOTOR

Cuts on a line, cuts out shapes, holds pencil, maintains line, pressure, makes corners by 5 years of age.

### Development of At Risk Child

#### ATTENTION

Attention deficits may be present. Behavior often noted as hyperactive, hypoactive, or distractible. Inhibition control does not develop in a normal manner, therefore focus and concentration are faulty.

#### COORDINATION GROSS MOTOR

Sometimes observed as clumsy in body movements in classroom. Often below normal limits when observed on specific items (alternating feet in walking up steps, skipping, learning to jump rope).

#### FINE MOTOR

Difficulty maintaining pattern of cutting motion results in jerky motion, jagged cutting. Holds pencil in awkward fashion, difficulty maintaining a line, pressure, round corners.

### Montessori Methods that Enhance Learning for the At Risk Child

#### ATTENTION

**Prepared Environment:** organization of materials, room areas analyzed for use by children.

**Classroom Atmosphere:** ordered calm.

**Order in Presentation:** assists focus, child waits for closure.

**Silence game:** teaches inner calm, concentration, focus.

**Classroom Structure:** clear limits/freedoms, teacher accepts role to help children develop inhibition techniques, central focus.

#### CO-ORDINATION GROSS MOTOR

**Manipulation of Materials:** carrying/using multi-sensory materials of various sizes and weights.

**"On the Line" procedures:** moving to rhythms, marching, hopping, skipping to music. Indirect/direct instruction in basic gross motor movements through a Perceptual Motor Skills program.

#### FINE MOTOR

**Eye-Hand Co-ordination:** manipulation of materials in all areas of curriculum.

**Hand Co-ordination:** preparation of the hand for writing use of thumb, index and middle fingers working together for grasp and release. Particular training in the pre-writing activity of metal insets.

## Development of Average Child

### ORGANIZATION

Order and sequence appear to be learned by imitation.

### PERCEPTION

Matches, discriminates sensory information. Perceives patterns in shape, color, numbers.

### WORK CHOICES

Chooses variety of work, usually proceeding to more difficult concepts.

## Development of At Risk Child

### ORGANIZATION

Difficulty noted in ordering work tasks and working in a sequential way.

### PERCEPTION

Matching is usually within normal limits. Difficulty with discrimination of sensory information noted. Discrimination/memory difficulties in math or letter symbols frequently seen. Association of symbol to name often a problem.

### WORK CHOICES

Chooses simple work that has been mastered, avoids work that is perceived as "harder." Avoids letters and/or numbers, avoids written work, needs teacher guidance for choices.

## Montessori Methods that Enhance Learning for the At Risk Child

### ORGANIZATION

All activities in all curriculum areas have a specific order and sequence. The teacher demonstrates, the child imitates. The teacher helps the child refine his work habits from haphazard trial and error attempts to procedures which help the child gain the skills of analysis necessary for effective organization of work.

### PERCEPTION

Through the Sensorial curriculum the teacher can assess the child's ability to perceive, discriminate and graduate visual, auditory, tactile, olfactory and gustatory information. These sensorial discriminations and the associated language concepts are significant in the progression to higher cognitive functions, such as categorizing, generalizing, and the beginning of reasoning. All areas of the curriculum utilize VAKT to assist the child in the perceptual discrimination and memory required in language and math.

### WORK CHOICES

Procedures allow the teacher to guide the child in learning to make his choice of work. She may allow choice, limit choices, or make choices for the child until he can do this task independently.

## Development of Average Child

### HABITS

Chooses work, uses procedure with purpose, replaces the work on the shelf.

### CYCLE

Chooses one activity after another varying the difficulty of choices.

## LANGUAGE

### ORAL

Has a vocabulary of approximately 2,500 to 5,000 words and usage of this vocabulary or basic communication with appropriate sentence structure.

## Development of At Risk Child

### HABITS

Avoids work, often insecure due to lack of successful learning experiences. When chooses, often replaces without using or leaves work and wanders the room.

### CYCLE

Does not establish a true cycle without teacher support.

## LANGUAGE

### ORAL

Vocabulary deficiencies seen in labeling, sentence formation and usage in running speech. Often seen as a quiet child, child who is confused by simple directions. Child who often says "you know." A portion of the at risk population is normal in vocabulary development. High incidence of articulation and rhythmical difference.

## Montessori Methods that Enhance Learning for the At Risk Child

### HABITS

The structure of the classroom and the procedures for working with the activities fosters organized work habits.

### CYCLE

The teacher can enhance the work cycle by teaching the child to make choices, how to set up his work, areas appropriate for work, completion of activities and return of the activity to its location.

## LANGUAGE

### ORAL

All lessons made silently to allow child to process the perceptual information being demonstrated and then the labels, the language concepts, are associated. Specific vocabulary covered. Curriculum for the at risk child must be extended from vocabulary development to effective oral communication.

## Development of Average Child

### WRITTEN LANGUAGE

If presented, has mastered most of the letters and the basic sounds of the language. Usually can blend these sounds and decode. Often is beginning to read by 5 years of age.

## Development of At Risk Child

### WRITTEN LANGUAGE

Inconsistency in performance seen in learning letter symbols and sounds. Variable performance with all written symbols activities, difficulty in perceiving the patterns of words.

## Montessori Methods that Enhance Learning for the At Risk Child

### WRITTEN LANGUAGE

Prerequisites: Sensorial Curriculum/Pre-Writing Activities/ Oral Language Development in progress.

Presentations begin with the multi-sensory Sandpaper Letters with which the child can receive visual, auditory, kinesthetic and tactile information to increase the sound/symbol correspondence. Several activities presented after the Sandpaper Letters give repeated practice through varied materials in sound/symbol association. These proceed from concrete to abstract.

The Movable Alphabet provides the child with 3 dimensional letters which the child may manipulate to practice Word Building by using his sound/symbol knowledge. The activity gives the child a beginning reading activity at the word level before presenting the challenge of reading in a book. The activity reinforces the left to right progression of language. Reading, Spelling and Writing proceed at the child's rate through a hierarchy of simple to complex word patterns. The child moves from word building to sentence building to reading/writing stories and books, to grammar analysis

Table V

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## Development of Average Child

### MATH

Gains number to quantity concepts, math symbols, math concepts and beginning computation by 5.

## Development of At Risk Child

### MATH

Spotty performance on # to quantity concepts, longer work time for mastery, erratic performance on symbol/numeral association, math concepts often superior to computation, difficulty with immediate recall of facts, difficulty with patterns as seen in odd/even, writing to 100, skip counting, difficulty with 1:1 correspondence.

## Montessori Methods that Enhance Learning for the At Risk Child

### MATH

Pre-requisites: Sensorial Curriculum through Red Rods/Pre-Writing Activities begun. Number to quantity activities presented to establish quantity/symbol relationship. Materials are manipulative and multi-sensory. Materials move from concrete to abstract. Three Period Lesson used to attach language to quantity. Number to quantity practiced out of sequence and in sequence. Number to quantity activities include Number Rods (1-10), Spindle Box (concept of 0), Tile Game (1-10 odd/even). Teens Board and Tens Board allow for language of teen numbers and the tens number to be introduced by number to quantity. Introduction of the decimal system (language of number to quantity) provide child repetitions of building various quantities from 1-9,000 with the golden beads and matching the numerals. Addition, multiplication, subtraction, and division introduced with golden beads. Writing of numerals introduced with Sandpaper numerals. Skip counting introduced with the manipulative bead chains. Functions practiced with additional multi-sensory materials addition strip board, subtraction strip board, multiplication board, division board.

### CO-OPERATIVE BEHAVIORS

Usually has gained inhibition control by 5 which enables him to cooperate with a teacher and peers in a learning environment. Given encouragement, enjoys the acceptance of responsibility and independence. Follows a model of consideration of others.

### CO-OPERATIVE BEHAVIORS

Has not always experienced the neurological maturation which allows inhibition control. Can be seen as stubborn, willful, immature, silly or withdrawn. Lacking self control he has not developed a cooperative spirit with adults or other children. Needs direct instruction in inhibition, how to accept responsibility, how to persevere, how to use independence, how to act in a considerate manner.

### CO-OPERATIVE BEHAVIOR

The experienced teacher with specific training in teaching at risk students accepts as part of her responsibility the guidance and instruction of appropriate behaviors and social skills. She will teach the child through specific techniques inhibition of impulsive behavior, increased self-control, the acceptance of responsibility, perseverance, independence and consideration for others

For an expanded explanation of each area of enhancement for the at risk student contact the author: Joyce S. Pickering, Executive Director, The Shelton School; 5002 West Lovers Lane, Dallas, Texas 75209. (214) 352-1772.

Montessori Curriculum  
A specific educational  
program which enhances:

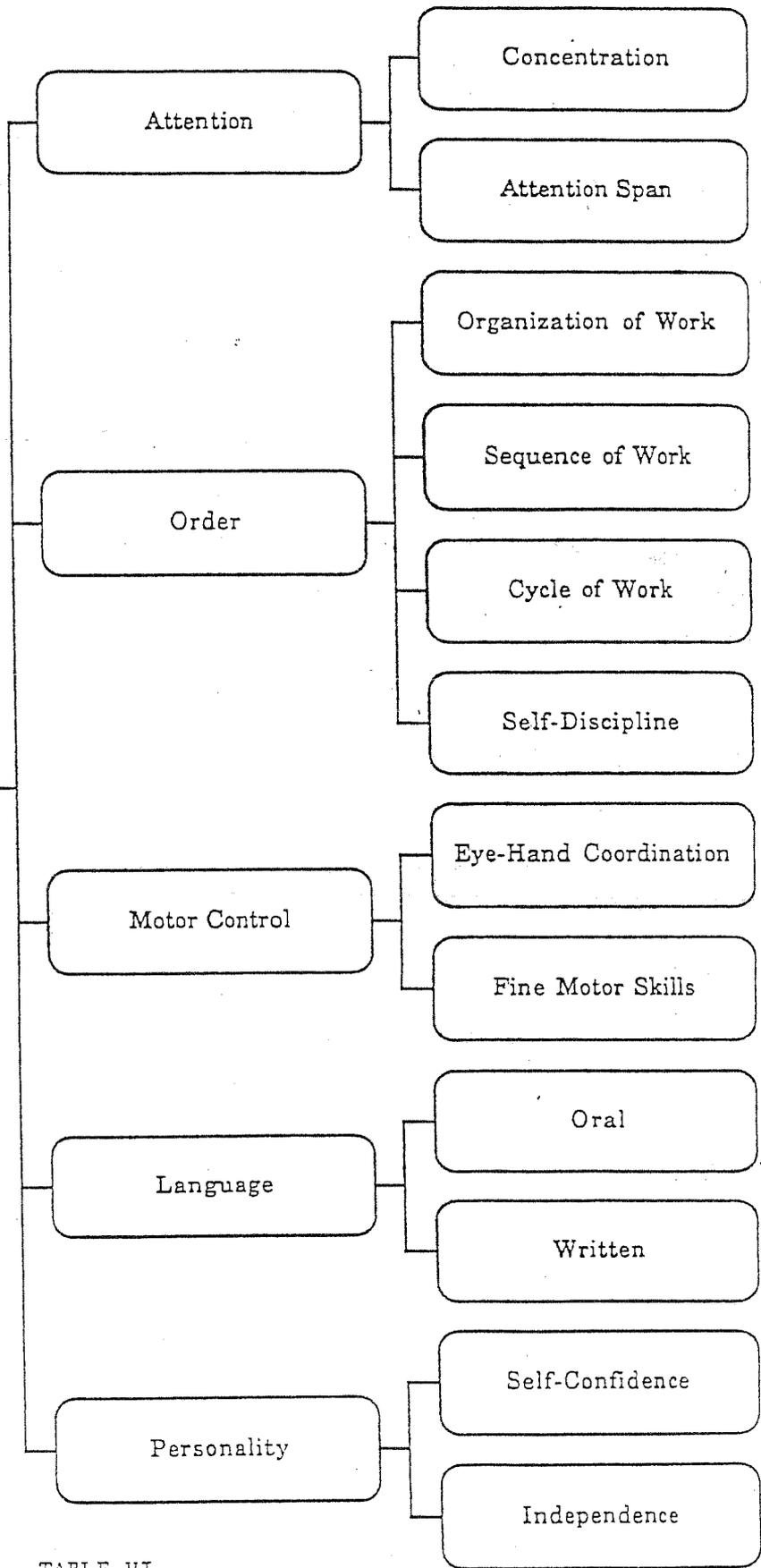


TABLE VI

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