

**THE EFFECTS OF SIMULTANEOUS TEACHING
TECHNIQUES ON ELEMENTARY
LEARNING DISABLED
CHILDREN**

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CHAPTER I

INTRODUCTION

American schools have long taught to the strengths of the left hemisphere of the brain. Current educational brain research, however, has shown that this one-sided approach does not tap the whole brain's capacity for learning (Mannies, 1986).

Several researchers (Jarsonbeck 1984, Wheeler 1983, Olrich 1983) investigated the relationship between learning disabled students' academic success and failure with their learning styles and the teaching methods employed. Their findings indicated an improvement in classroom test scores and attitudes, when a multisensory style of teaching was practiced. Their research indicated even greater improvement in test scores when the teaching method employed matched the student's preferred learning style.

In spite of research to the contrary, many educators suffer from the misconception that mind and body are basically separate (Aldridge, 1989). Each student brings mind, body, imagination, feelings and sensations from every part of the body into each learning experience. If all of these parts are working together, maximum learning can take place. If any of these parts is not functioning, a breakdown in the learning process may occur.

The human brain is constantly being bombarded with sensory information. In her book, Sensory Integration and the Child, Jean Ayres states:

The brain must organize all of these sensations if a person is to move, learn and behave normally. The brain locates, sorts, and orders sensations--somewhat as a traffic policeman directs moving cars. When sensations flow in a well organized or integrated manner, the brain can use those sensations to form perceptions, behaviors and learning. When the flow of sensations is disorganized, life can be like a rush-hour traffic jam.

In recent literature, learning processes have been identified with, and localized within, either the left or the right hemisphere of the brain. The two hemispheres do not do exactly the same things, nor do they do them in exactly the same way. Certain functions are specialized in one hemisphere or the other. Good specialization of function usually leads to overall efficiency in brain processing, while poor specialization often slows down language development and academic learning. Good specialization or "lateralization" is probably the end product of normal brain growth and maturation (Ayres, 1987). For complex functions such as spatial perception, language and speech, and cognitive thinking, both hemispheres of the brain need to be involved and work together. Recent studies show that the hemispheres actually function in concert with each other on almost all tasks (Grevenow, 1988). The interaction of the sensory systems, namely, visual, auditory, vestibular, tactile, and kinesthetic, give meaning to sensations and form the basis for mature lateralization to occur.

For purposes of this study, two types of information processing will be referred to; sequential or left brain, and simultaneous or right brain. Studies show a high percentage of learning disabled (LD) children are simultaneous

learners, yet our education system relies heavily on sequential methods of teaching (Kaufman, 1983). Strong simultaneous learners do not do well in our schools where sequential, verbal, strategies are emphasized in teaching (Mannies, 1986). Teachers need to develop a repertoire of teaching techniques that stimulate both sides of the brain, not only to help reach LD children but also to develop more fully the potential of all children.

STATEMENT OF THE PROBLEM

The problem was to determine the effects of a simultaneous teaching method for teaching spelling to learning disabled children ranging in age from 10 to 12 years old.

HYPOTHESIS

The following hypothesis was tested at the .05 level of significance. The stated hypothesis was examined to see if a difference occurred among three methods of teaching, namely, visual/tactile (v/ t) , visual/auditory (v/a), and visual/auditory/kinesthetic (v/a/k). The v/t method represented a sequential teaching style, while the v/a and v/a/k methods represented simultaneous teaching styles. It was hypothesized that:

There would be no difference among the three methods regarding improvement in spelling scores.

DELIMITATIONS

This study was delimited by the following:

1. The setting for the study was a private school for children with learning disabilities.
2. The students involved in the study ranged in age from 10 to 12 years old.
3. The students were placed into treatment groups by random selection.
4. The effectiveness of the teaching method was determined by students' performance of spelling tests.

LIMITATIONS

This study was limited by the following:

1. The number of subjects involved was 36
2. The range of disabilities was not accounted for within the study.
3. Due to space limitations only the visual-tactile group had a quiet room to themselves. The other two groups shared one large gymnasium with one group at either end.
4. Due to time limitations and allowing for control, the daily Pre and Post tests were administered one hour apart.

DEFINITIONS

In order to understand the terms used in this study, the following definitions are provided:

Learning Disabled: The term is used to describe children who qualify for special services in the school as defined by Public Law 94-142 under the heading "Specific learning disability". "Specific learning disability" means a disorder in one or more of the basic psychological processes involved in understanding or in using language spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain disfunction, dyslexia, and developmental aphasia. The term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, or of environmental, cultural, or economic disadvantage.

Left-Brain: The left half (hemisphere) of the cerebrum. It is associated with verbal functions, and controls the right side of the body (Kaufman, 1979).

Sequential: The term used to describe processing associated with the left hemisphere. It is characterized as linear, verbal, analytic, and logical (Edwards, 1979).

Right-Brain: The right half (hemisphere) of the cerebrum. It is more efficient in processing spatial and nonverbal components and controls the left side of the body (Kaufman, 1979).

Right-Brain: The right half (hemisphere) of the cerebrum. It is more efficient in processing spatial and nonverbal components and controls the left side of the body (Kaufman, 1979).

Simultaneous: The term used to describe processing associated with the right hemisphere. It is characterized as holistic, spatial, and relational (Edwards, 1979).

Learning Style: The most efficient modality used by an individual for problem solving and information processing. The major learning modalities are visual, auditory and kinesthetic.

Processing: The term used to describe how we learn and how we teach. It does not include what is learned or what is taught.

Multisensory: Learning through more than one sensory system.

Perception: The process of organizing and giving meaning to sensory information.

Spatial Perception: The awareness of where one's body is in space.

Lateralization: The specialization of function within either of the two cerebral hemispheres of the brain.

Sensory integration: The ability to organize sensory information for use.

Sensory integration system: The functions of the Central Nervous System in humans, including sensory input, organization, motor response, and sensory feedback.

Brain stem: The lowest and innermost portion of the brain. The brain stem contains nuclei that regulate internal organic functions, arousal of the nervous system as a whole, and elementary sensory-motor processing (Ayres, 1987).

Cerebellum: The area of the brain that lies posterior to the cerebral hemispheres. It processes proprioceptive and vestibular sensations,

enabling the body to make precise and accurate movements. (Ayres, 1987).

Cerebral Hemispheres: The largest area of the brain in size. These two hemispheres continue the sensory processing that begins at lower levels and assist in producing voluntary motor responses and behavior (Ayres, 1987).

Cerebral Cortex: The outer layer of the cerebral hemispheres. It includes areas for very precise sensory processing, especially of visual and auditory details and sensations from the body. It executes fine motor movements, speech, and thought (Seaman and DePauw, 1989).

CHAPTER II

REVIEW OF LITERATURE

Throughout the literature concerning academic and physical performances of "learning disabled" (LD) students, two common factors can be found: a) optimum learning takes place when the brain is able to adequately organize sensations coming from all parts of the body (Ayres, 1987); and, b) students' achievements increase when teaching methods match their learning styles (Dunn, Beaudry, Klavas, 1989). The review of literature in this section will be divided into three categories: a) sensory integration within the brain, as defined by Janet A. Seaman and Karen P. DePauw in The New Adapted Physical Education A Developmental Approach; b) biologically and developmentally imposed learning styles and the LD student; and, c) simultaneous versus sequential learning processes and the LD student.

SENSORY INTEGRATION WITHIN THE BRAIN

Sensory integration is the organization of sensation for use. Sensations enter the brain continuously from every part of the body. The brain locates,

sorts and orders these sensations. When this process is well-organized adequate learning takes place. When the flow of sensations is disorganized, life can be like a rush-hour traffic jam. (Ayres, 1987)

Learning and behavior are the visible aspects of sensory integration. The invisible activity takes place within the nervous system composed of the spinal cord, brain stem, cerebellum, and cerebral hemispheres. Although the spinal cord is a vital part of the nervous system, for purposes of this study, only the brain stem, cerebellum, and cerebral hemispheres will be examined.

The Brain Stem

The brain stem is a small bundle of neurons situated at the top of the spinal cord at about the height of the ears. The sensory tracts in the spinal cord continue into the brain stem. In addition to these tracts, the brain stem contains important and complex nuclei. In many of these nuclei two or more sensations come together. The central core of the brain stem is a group of neurons and nuclei named the reticular formation. This net-like formation connects the brain stem to every sensory system, to many motor neurons, and to most other parts of the brain. These connections enable the reticular formation to play a very important part in processing and integrating sensory-motor activities. Some of these reticular nuclei organize the activities of the cerebral hemispheres. This organization allows a person to change his/her focus of attention. If reticular processes are not well organized, the person encounters great difficulty in focusing his/her attention, that is, staying on task, and daily events tend to be overwhelming. Another set of nuclei, the vestibular nuclei, located within the brain stem

process sensations from the gravity and movement receptors in the inner ear. This information is needed to maintain upright position and equilibrium.

Cerebellum

The cerebellum lies posterior to the brain stem. One of the functions of the cerebellum is to complement the vestibular nuclei. The cerebellum processes all types of sensations but is especially useful for organizing gravity, movement, and muscle-joint sensations.

The Cerebral Hemispheres

The greatest mass of the brain consists of the two cerebral hemispheres, one on each side of the head. Within these hemispheres, precise and detailed meaning is given to the sensations.

The outer layer of the cerebral hemispheres is called the cerebral cortex. This is a highly specialized area of the brain; there is one section for visual perception, another for sound interpretation and a different one for language interpretation. There is an area for every part of the body. Even though these areas are specialized to interpret just one sense, each area also receives information from the other senses. The cerebral cortex not only continues to process the in-coming sensations but also forms associations between the various types of sensations.

Sensations travel through the nervous system to specialized areas of the brain as electrical impulses. Within the association areas of the cerebral cortex, the electrical activity comes together to form a unified whole. This higher level cortical organization is completely dependent upon the sensory organization at each of the lower levels. Every muscle, joint, vital organ, bit of skin, and sense organ in the head sends sensory input to the brain. The

nervous system uses this information to adapt the body and mind to that information.

CENTRAL NERVOUS SYSTEM INFORMATION PROCESSING

The steps involved in a well functioning CNS include the following as described by Seaman and Depauw (1989):

1. **Reception**: Sensory input is received at some level of the CNS as a sensation. The sensation may be at the conscious or subconscious level. The next three sub-topics are included in the reception phase.
 - a) **Mediation**: Selective attention and arousal. Only the important information is sent on to higher cortical levels.
 - b) **Modulation**: Meaning is given to the input.
 - c) **Association**: Past input is retrieved from the memory and compared with the new input.
2. **Sequencing**: The new information is put in appropriate order.
3. **Motor planning**: A decision is made as to what the appropriate response should be.
4. **Imagery**: A mental picture is formed as to what the response should look and feel like.
5. **Motor response**: All observable behavior is motor output. Whether the output is in the form of throwing a ball, writing a sentence, or speaking, the central processing is the same and the result is motor output.
6. **Feedback**: In order to complete the cycle, and for learning to occur, the information that the individual receives as a result of some response, reenters on the input end of the system becoming new input in itself. Another function of feedback is to provide information to the brain's memory bank for future use.

In a well functioning sensory integration system, the feedback matches the input. If there is a breakdown in the system anywhere along the way,

the output is incorrect. A learning disability may be a product of a breakdown in the sensory integration system (Ayres, 1987).

THE SENSES

Sight

The retina of the eye is a receptor that is sensitive to light. Light stimulates the retina to send visual sensory input to the back of the brain in a horizontal pathway. From here the message travels to the visual processing centers in the brain. These centers process the impulses and relate them to other types of sensory information.

The visual system processes stimuli received through the eyes, and needs light in order to develop and ensure maturation of the optic nerve. Vision is reflexive in nature at the lower neurological levels and becomes increasingly more complex as the system matures.

Each eye sends impulses to both cerebral hemispheres. Each eye has a field of vision that is divided into halves. The right visual field of each eye sends information to the left hemisphere, and the left visual field transmits to the right hemisphere. Communication between the two hemispheres of the brain is necessary in order for this phenomenon to occur.

Sound

Sound waves in the air enter both ears and stimulate the auditory receptors of the inner ear to send messages to the auditory processing and organizing centers. The auditory organizing centers are very close to the

visual processing centers in the brain and the two centers exchange information. The auditory and visual impulses are sent to other parts of the brain stem and cerebellum for integration with other sensations including motor messages. The auditory system also has a close association with the vestibular system due mainly to their close proximity within the brain.

Vestibular

Housed within the inner ear is a complex structure of bones called the labyrinth, from the Greek word meaning a maze of winding passages. The labyrinth contains the auditory receptors and two types of vestibular receptors. One type of receptor responds to the force of gravity. The other vestibular receptor responds to the speed and direction of the movement of the head.

Vestibular information is obtained through the eyes, nerve endings throughout the body, and the vestibular labyrinth. The functions of the vestibular system are to maintain balance and equilibrium, muscle tone, position of the head in space and an awareness of motion. It contributes to the coordination and timing of all the sensory input necessary for our perception of space and our position within that space. Visual information is useless unless the brain can relate what is seen to some physical reference. The vestibular system seems to be the unifying source. It forms the basic relationship of a person to the physical world. An adequately functioning vestibular system seems to prime the entire nervous system and keep it functioning effectively.

Proprioception/Kinesthesia

Proprioception, from the Latin word "proprius" meaning "one's own", refers to sensations from within the body that occur especially during movement. A more commonly used term for proprioception, is kinesthesia. These two terms are used interchangeably throughout the study. The proprioceptive system receives information from muscles, bones, joints, and ligaments. The messages travel up the spinal cord to the brain stem and cerebellum, and to areas of the cerebral hemispheres that do not produce conscious awareness. An adequately functioning proprioceptive system results in a basic awareness of one's body in space and provides information necessary for conscious, planned movement. Children with poorly organized proprioception often have trouble doing anything if they cannot see it with their eyes (Ayres, 1987).

Touch

The touch-pressure or tactile system is the largest sensory system of the human body. It receives stimuli from receptors beneath the skin from head to toe. The system can be divided into two functioning levels: the touch level and the tactile level. The touch level sends non-localized, general information to the brain stem while the tactile level sends precise information of location and amount of pressure to the sensory areas of the cerebral cortex.

The tactile sense is predominant throughout life, critical to life support and development. Several studies with exceptional children connect the tactile system with the learning process. Rice (1975) found that premature babies responded to sensory stimulation and made significant gains in weight, neurological development, and mental processing. Huss (1977)

found that sensory input, especially tactile stimulation, can influence motor performance.

When the body and all of the senses work together as a whole, adaptation and learning are facilitated in the brain. If there is a breakdown at any point along the way, association and memory are affected and learning becomes a difficult process. If it is true that all of the sensory systems communicate with each other and rely on each other for information, the learning process must include information from all of the systems. Too often our schools make the mistake of trying to teach through the visual and auditory systems independently of the other systems creating an inadequate learning environment. For example, the vestibular system must function efficiently in order for the eyes to focus on either a moving or stationary object. A child might move his/her fingers under a word or a line of print while he/she reads because; 1) it is easier to follow a moving finger than it is a focus on the stationary letters, or 2) he/she has a physical need of the tactile stimulation. These are examples of how the child's inner needs direct him/her to make the appropriate adaptations in order for his/her body and brain function most efficiently.

LEARNING STYLES AND THE LD STUDENT

Students' achievements increase when teaching methods match their learning styles. Learning style is a biologically and developmentally imposed set of personal characteristics that make the same teaching method effective for some and ineffective for others (Dunn & Griggs, 1988).

The auditory, visual, and tactile-kinesthetic senses form the major learning modalities. The learner receives information from all the senses but one modality usually predominates and the learner tends to rely on that modality as the primary means of learning and expression. A breakdown in any of the senses creates the potential for a learning disorder.

While the majority of students prefer an auditory or visual modality, there are some who are primarily tactile-kinesthetic learners. These children learn best by touching and moving rather than hearing and seeing. For them, information is taken in through the hands and through movement. They like to touch things, move them around, and move themselves around. These children are often referred to psychologists for their hyperactivity and lack of concentration. A common educational placement for these children is an LD classroom for at least part, if not the whole, day. Kinesthetic learners flourish in this setting partly because the learning disabilities specialists are more likely use to tactile and kinesthetic materials as a primary teaching source such as sandpaper letters and substances of different textures and shapes. They also have students learn math facts or spelling words while bouncing on a rebounder or mini trampoline, clapping, or writing large letters and numbers in the air. (Williams, 1983). Three studies (refer to Table 1 on the next page) within the past decade reveal that when learning disabled youngsters or those classified as "underachievers" were taught with instructional resources that both matched and mismatched their preferred modalities, they achieved statistically higher test scores when their preferred modality was a match rather than a mismatch (Jarsonbeck 1984, Wheeler 1980, Wheeler 1983). Further, when children were taught with multisensory resources initially through their primary modality and then

reinforced through secondary or tertiary modalities, their scores increased even more.

The table on the following page is adapted from surveys on research concerned with perceptual learning styles by researchers Dunn, Beaudry and Klavas, (1989).

TABLE I
RESEARCH CONCERNED WITH PERCEPTUAL LEARNING STYLES

Researcher/Date	Sample	Subject Examined	Perceptual Preference Examined	Achievement
Jarsonbeck 1984	4th Grade Underachievers	Mathematics	Auditory, visual, tactile	+
Wheeler 1980	Learning Disabled 2nd Graders	Reading	Auditory, visual, tactile, sequenced	+
Wheeler 1983	Learning Disabled 2nd Graders	Reading	Auditory, visual, tactile,	+

(+) = significant positive findings

Therefore, when a teacher teaches and evaluates in only one mode, he or she is adequately serving only those students who prefer to learn in that style. Research suggests that every student regardless of learning modality would be better taught using their preferred modality.

SIMULTANEOUS VS. SEQUENTIAL LEARNING PROCESSES AND THE LD STUDENT

Numerous studies on how we learn have identified two separate ways that our brains process information. Sequential and simultaneous

processes have been identified by cerebral specialization researchers Das and Kirby, 1978; and, neuropsychologist Luria 1966. Although the specific terminology used in their research differ slightly, the definitions of the two processes are remarkably consistent.

In her book Teaching for the Two-Sided Mind: Linda Verlee Williams summarizes the definitions as follows:

The left hemisphere processes *sequentially*, in a step-by-step manner. This linear processing is temporal or time-related in that it recognizes that one stimulus comes before another. Verbal perception depends on the awareness of the order or sequence in which sounds occur. This type of processing relies on the ability to discriminate the relevant features, to reduce a whole to meaningful parts -- in short, to analyze.

The right brain appears to specialize in *simultaneous* processing or processing in parallel. It does not move from one feature to another but instead seeks patterns and gestalts. It integrates component parts and organizes them into a whole. It is interested in relationships. This method of processing is most efficient for the majority of visual and spatial tasks and for recognizing musical melodies, since these tasks require that the mind construct a sense of the whole by perceiving a pattern in visual or auditory stimuli.

Hemispheric specialization has great significance in all areas of education. Researchers studying the differences in the functioning of the hemispheres are contributing to the understanding of how learning takes place and the factors that create learning problems. Research conducted on reading remediation has shown that a high percentage of LD children are strong simultaneous learners (Gunnison, Kaufman, and Kaufman, 1982). Additional studies have found that a majority of LD children score higher on simultaneous tests than sequential tests (Dunn, Beaudry, Klavas, 1989).

There is a real need for teachers to be trained in current brain research and theories. Teachers need to understand how the brain functions and how such an understanding relates to the classroom. Only when teachers truly understand hemispheric specialization and how it relates to learning styles can they change or broaden their teaching styles to encourage development of both hemispheres (Grevenow, 1988).

Even though investigations reveal high simultaneous processing occurs in LD students this does not imply inactivity in the left hemisphere. Rather, the picture that emerges from hemispheric research is of a brain specialized for different, but complementary forms of processing. One form is not superior to the other; effective thinking and learning require both (Mannies, 1986). Given the importance of these two types of thinking, one would assume that both would be included in our education system. Unfortunately, this is often not the case. By using teaching methods that provide a balance of both sequential and simultaneous cognitive processing, teachers would be more likely to reach every child in their classroom (Grevenow, 1988).

SUMMARY

In our culture, we tend to think of body and brain as separate entities, with thought being a process of the brain and action a movement of the body. However, the sensory and motor systems are part of both the body and the brain, and their proper development is prerequisite to successful cognitive thinking and learning. While both hemispheres process sensory

stimuli, verbal processing (equated with knowledge) occurs in the left hemisphere. A high percentage of LD children are right brain thinkers creating an unsuccessful learning environment.

Our present educational system has a dominance of left brain teaching techniques. Judging from over-flowing special education classrooms, many of who may be misplaced, it is time for a change. Our system of education needs to be redesigned so that every child is given an equal chance at success.

CHAPTER III

METHODS AND PROCEDURES

The purpose of this study was to determine if a simultaneous teaching method significantly improved the spelling abilities of 10 to 12 years old learning disabled children.

The procedures described in this chapter are categorized into two sections: a) preliminary procedures, and b) operational procedures. The preliminary procedures were: a) selection of students; b) selection of instruments; c) selection of treatment administrators; and, d) development of the study. The operational procedures were the collection of data and the treatment groups.

PRELIMINARY PROCEDURES

Selection of Students

One school was selected to participate in the study due to the unique population of the school. The entire population of approximately 90 students was tested and identified as having a learning disability. Prior testing was for the purpose of placement and was independent of this study.

Because the study was to include 10 to 12 years old children, 36 of the 90 students qualified to participate. The group of 36 students was divided by random selection into three groups of 12 students. The study included male and female subjects with the males outnumbering the females only due to population of the school. Gender was not considered a factor in the analysis of the study.

The students and parents were asked to sign an informed consent sheet (see Appendix A). This form included an explanation of the proposed research and a permission slip to be signed by the parents indicating approval for participation of their child in the program.

Selection of Instruments

Sixty spelling words were used in the study and can be found in Appendix B. The 36 participating students came from three classrooms. Each participating classroom teacher supplied 20, age-appropriate spelling words. Three or four words from each list was included in each of the six, 10 word spelling tests.

The materials supplied to each treatment group were as follows: Group 1) a list of spelling words, paper and a pencil; Group 2) a poster with the spelling words printed on it to be hung on a wall; and Group 3) two posters with the spelling words printed on them, individual jump ropes, and two mini trampolines.

Selection of Treatment Administrators

The classroom aide from each of the three participating classrooms was asked to assist in the project in the form of an administrator. A 30-minute training session was completed by each of the administrators. Each was

asked to administer the prescribed treatment in one of the three groups. The researcher administered treatment to half of Group 3 as deemed necessary during the training session with the assistants. It was felt by the administrators and the researcher that due to a time element involved and the extra activity involved with Group 3, that one administrator was insufficient for a group of 12 students. A second administrator was added to Group 3 with the first six names on the list being assigned to one administrator and the second six names to the second administrator. Because all of the students in Group 3 were receiving the same treatment, Group 3 was analyzed as one group.

Development of the Study

An eight-week program that was administered to the experimental group. Approximately 10 hours, 1 hour and 15 minutes per week, was needed to complete the program. Week #1 was a training session for the students with no spelling tests given, and Week #8 was a Thank You Party also with no spelling tests given.

OPERATIONAL PROCEDURES

Collection of Data & Treatment Groups

Each week, for six consecutive weeks, 36 learning disabled students ranging in age from 10 to 12 years old came to the gymnasium. Each student was given a sheet of paper and a pencil. The students were allowed to sit or lie anywhere in the gymnasium, on the floor, facing the

center of the room. A predetermined, 10-word, spelling test was given to the entire group (Pre test). Upon completion, the spelling tests were collected and placed in a folder marked Pre Test / Today's Date _____. The students were then asked to go to their treatment areas with their Group Leader.

Treatment was administered in each group according to the predetermined treatment plan (see Appendix C). Group 1 received visual and tactile stimuli; Group 2 received visual and auditory stimuli; and Group 3 received visual, auditory, and kinesthetic stimuli. At the end of the 30-minute treatment session, the entire group reassembled in the gym for "play" time.

"Play" time included games of low organization that were familiar to the whole group. These games were played just for fun and to give the students something else to think about before taking the spelling Post test. The intent was to have the children have fun as well as benefit from being part of the project.

After approximately 20 minutes of games, the students were again assembled as a group, given paper and pencils, and asked to sit or lie anywhere on the gym floor facing the center of the room. The same person administered a second spelling test on the same words that were presented an hour previously (Post test).

The Post tests were collected and placed in a folder marked Post Test / Today's Date _____. Pencils were collected and the students were lined up and dismissed back to their classrooms.

In order to insure confidentiality, the students were instructed to write only their initials on both their Pre and Post tests. The initials were then

assigned a number and graded by an independent source. Analysis was completed by this researcher according to student number only.

RESEARCH DESIGN

An experimental research design was used to determine the effects of a simultaneous teaching method of spelling on learning disabled children ranging in age from 10 to 12 years old. The independent variables in this study were the groups the children were in, the grades they were in, and the genders of the children. The dependent variables included the scores from the Pre and Post spelling tests.

STATISTICAL ANALYSES

The statistical analysis used a 2 x 2 ANOVA with repeated measures for the dependent variable. The Newman-Keuls Multiple Range Test was used to investigate where difference within the means occurred. All statistical tests were conducted using the .05 level of significance.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this chapter is to present the results and to provide a discussion of the results. This chapter is divided into the following sections: a) statistical results; b) analysis of hypothesis data; and, c) discussion of results.

STATISTICAL RESULTS

The hypothesis was evaluated to see if a difference occurred among the groups due to teaching methods employed. Table II displays the means and Table III presents the ANOVA results.

TABLE II
MEAN SCORES OF PRE AND POST SPELLING TESTS

	Group 1 (V/T)	Group 2 (V/A)	Group 3 (V/A/K)	Marginal
PRE	6.26	5.25	6.30	5.98
POST	7.35	7.58	8.63	7.83
MARGINAL	6.80	6.42	7.47	

A repeated measures ANOVA (Table III) was conducted to see if there was an interaction with the whole group and time.

TABLE III
ANALYSIS OF VARIANCE TABLE

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio
Group	9.65	2	4.82	0.55
Error	218.40	25	8.74	
Time	50.68	1	50.68	70.14*
Time X Group	5.15	2	2.58	3.57*
Error	18.07	25	.072	

* significant at the .05 level

The Newman-Keuls test was used to determine where significant differences occurred among the means regarding the interaction effect.

Newman-Keuls Multiple Range Test

1. All groups improved significantly from Pre to Post
 - a. 7.35 is greater than 6.26
 - b. 7.58 is greater than 5.25
 - c. 8.63 is greater than 6.30
2. The V/A/K group improved significantly more than the other two groups.
 - a. 8.63 is greater than 7.35 or 7.58

As noted in Table III, a significant interaction existed between the group and time. The Newman-Keuls range test was used to determine where significant differences occurred among the three groups. The results of the

Newman-Keuls test indicated that the mean scores of all of the groups were found to be significant and that the scores of the visual/auditory/kinesthetic group improved significantly more than the other two groups. Therefore, the teaching methods employed did make a significant difference on the children's spelling abilities.

ANALYSIS OF HYPOTHESIS DATA

The hypothesis was evaluated in this investigation using the .05 level of significance. The stated hypothesis was examined to see if a difference occurred among three methods of teaching. It was hypothesized that there would be no difference among the three methods regarding improvement in spelling scores. The results indicated that the mean scores of the Pre and Post tests were found to be significantly different. Therefore, the hypothesis was rejected.

DISCUSSION OF RESULTS

It was believed that there would be improvement in the Pre and Post test scores among all of the groups, but significant improvement only in the visual/auditory and visual/auditory/kinesthetic groups. The visual/tactile (v/t) group received sequential (left brain) stimuli, while the visual/auditory (v/a) and the visual/auditory/kinesthetic (v/a/k) groups received

simultaneous (right brain) stimuli. The v/a group was considered a simultaneous group due to the rhythmical method used by students during the oral recitations of the words and during the spelling of the words. The v/a/k group was considered a simultaneous group due to the movement activities during the academic process. Even though all of the groups showed significant increases in spelling abilities, the amount of improvement was as expected, that is, the least amount of improvement was seen in the sequential (v/t) group and the most improvement was seen in the simultaneous group with movement activities

The reason that all of the groups showed a significant increase in spelling scores could be due to the nature of the subjects' learning disabilities. It was not determined ahead of time what each child's specific learning disability was.

The amount of time between the Pre and Post tests could be another factor. The amount of time might not have been adequate to consider the spelling words as learned and committed to long term memory, but rather stored in short term memory and forgotten by the next day.

It was expected that the two groups using the simultaneous techniques would show more significant increases than the group receiving sequential stimuli. This did occur and is consistent with the findings of Jarsonbeck (1984), Wheeler (1980 & 1983), and Olrich (1983).

The final expectation was that the group receiving the most sensory input would show the most significant gains. This did occur and is also consistent with the findings of Jarsonbeck (1984), Wheeler (1980 & 1983), and Olrich (1983).

Although the learning styles of each student were not determined previous to the study, the research was based on the assumption that all of

the subjects were classified as learning disabled and would benefit through right brain teaching techniques. The students who were allowed to move and interact with each other not only showed the most significant increases, but also commented to the researcher, their classroom teachers and to their parents about the fun that they were having, while the children in the sequential group asked repeatedly to be changed to another group because they were bored.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The final chapter consists of a summary of the study, findings, conclusions and recommendations for further studies.

SUMMARY

The purpose of this study was to address the need to include both left brain, sequential, and right brain, simultaneous, activities into the academic curricula in our school systems. Our present education system has a dominance of left brain teaching techniques creating an unsuccessful learning environment for many students. A six week spelling unit was developed which included a variety of teaching techniques.

Thirty-six learning disabled students ranging in ages from 10 to 12 years old participated in the study. The children were randomly assigned into one of three groups. Each group represented a different teaching style including: Group 1 -- left brain activities, Group 2 -- right brain activities, and Group 3 -- a combination of both left brain and right brain activities.

Data was collected as follows: Once a week the large group (36 children), was assembled and given a 10 word spelling test. The children were then dismissed to their study groups where a proctor led them in pre-planned study activities of approximately 30 minutes. The group was then reassembled for play time consisting of popular games and activities in order to give the subjects time to think about something other than the spelling words. After the 20 -- 30 minute play time, a second spelling test was administered to the entire group. Scores were recorded for both tests.

FINDINGS

The data collected in this study were analyzed at the .05 level of significance. The stated hypothesis was examined to see if a difference occurred among the groups due to teaching methods employed, and to see if an interaction existed between the whole group and time. The data yielded the following findings:

1. There was a significant increase in the children's spelling skills in all of the groups. Therefore, the hypothesis was rejected.
2. The increase was greater in the visual/ auditory group than the visual/tactile group.
3. The visual/auditory/kinesthetic group showed the greatest increases of the three groups.

CONCLUSIONS

In consideration of the results and within the limitations imposed by this study, the following conclusions seem warranted:

1. Each method, visual/tactile, visual/auditory and visual/auditory/kinesthetic, was effective in the teaching of spelling.
2. One method, the visual/auditory/kinesthetic was the most effective of the three.
3. The results were consistent with the literature.

RECOMMENDATIONS FOR FURTHER STUDY

With reference to the purpose, methods, procedures and results of this study, recommendations for further research in this area are as follows:

1. A study similar in design to the present study but one in which the children's preferred learning styles are determined, and both matched and mismatched with the treatment plans for analysis needs to be undertaken.
2. A study similar in design to the present study but with more parental involvement in order to be able to increase the time between the Pre and Post tests should be undertaken.
3. A study similar in design to the present study but one which would include not only learning disabled children and underachievers, but

the full range of students within the typical "normal" classroom needs to be undertaken.

4. A study similar in design to the present study but one in which the curriculum is expanded from the six week format to a longer one should be undertaken.

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APPENDIX A

INFORMED CONSENT SHEET

January 7, 1992

Dear Parents,

In order to complete the requirements necessary in my quest to earn a Masters Degree in Adapted Physical Education, I will be conducting a research project here at Town and Country School. The project will involve all students ranging in age from 10 to 12 years old, with your permission and consent. In order to ensure confidentiality, the children will be recorded as numbers rather than names. Attached you will find a copy of the research project. Results will be furnished for you upon request. The specific dates of the project will be January 22 & 29; and February 5, 12, 19 & 26, 1992.

Please read the attached information and return the consent form to the school office by January 17, 1992.

Sincerely,

Cathye Hotaling

I give my permission for my child _____ to participate in a research project conducted by Cathye Hotaling at Town and Country School from January 22, 1992, through February 26, 1992. I understand that the results of the study will not be included in my child's classroom grades or placed in the child's permanent files.

No, I do not wish for my child _____ to take part in the research project.

Parent/Guardian Signature _____

Today's Date _____

PROCEDURES

The study will be experimental in nature. It will be conducted for one hour, one day per week for a total of 6 consecutive weeks. One week prior, the study will be explained in detail to the students and a Thank You party will be held in their honor upon conclusion of the project. The study will consist of Pre and Post tests of 10 new spelling words given to all students during each weekly session.

The large group of approximately 36 students will be divided, by random selection, into three smaller groups. The study will include male and female subjects with the males outnumbering the females only due to the population of the school. Gender will not be considered a factor in the analysis of the study. The spelling words used in the study will be compiled with the help of the three classroom teachers to avoid repeating classroom spelling words. Each week: 1) the whole group will be given a 10 word spelling test (Pre test), 2) treatment administered, 3) Post test given and 4) analysis will be made of the results. At the end of the 6 week period an overall analysis will be made.

HYPOTHESIS

It is hypothesized that there will be no difference among the three methods regarding improvement in spelling words. NOTE: The treatment plan (see Appendix C) was also furnished to the parents.

APPENDIX B

LIST OF SPELLING WORDS

SPELLING WORDS

WEEK 1

1. born
2. fork
3. fort
4. pool
5. loop
6. root
7. tooth
8. step
9. penny
10. pennies

WEEK 2

1. pencil
2. bench
3. chest
4. bloom
5. speak
6. dream
7. contest
8. corner
9. before
10. fourth

WEEK 3

1. cannot
2. banker
3. asking
4. feast
5. beast
6. cable
7. forty
8. silk
9. kick
10. rich

WEEK 4

1. having
2. watching
3. window
4. stable
5. paste
6. waste
7. fourteen
8. pouring
9. sink
10. film

WEEK 5

1. without
2. does
3. radio
4. has
5. attic
6. address
7. happening
8. windy
9. enjoy
10. second

WEEK 6

1. ask
2. watch
3. done
4. sitting
5. bigger
6. pillow
7. middle
8. pretend
9. correct
10. baseball

APPENDIX C

TREATMENT PLAN

TREATMENTS

Visual/Tactile Group

The group of approximately 12 students will be given a pencil, paper, and a list of the spelling words. The moderator will read the words with the students and furnish a definition for each word. The students will then be asked to write each word 5 times on their paper and study the words silently when they are finished and until each person in the group is finished.

Visual/Auditory Group

The spelling words will be written on a chalkboard or on poster board and hung on the wall. The group of approximately 12 students and one moderator will sit in a semi-circle on the floor facing the spelling words. In unison the group will say the first word out loud and spell it while looking at the word. Next they will close their eyes and repeat the process, again in unison. They will proceed through the entire list in this fashion. The group will be given time to read and spell the words on their own for five minutes before repeating the entire process in unison.

Visual/Auditory/Kinesthetic Group

All of the spelling words will be written on a chalkboard. A mini-trampoline will be placed in front of the chalkboard and several jump ropes will be available in the same area. One student at a time will perform on the mini trampoline while the remaining students may choose to jump rope, do jumping jacks, or jog in place while studying the spelling words. The mini trampoline procedure will be: the student will start bouncing on the

trampoline, read the first spelling word out loud then spell the same word out loud while looking at it. The child will then close his/her eyes and repeat the procedure. If he/she misspells the word, the same word will be repeated using the same procedure. If he/she spells the word correctly, he/she will continue in this manner until all of the words have been correctly identified and spelled. If the child loses his/her balance while bouncing with his/her eyes closed, he/she may turn away from the board and while still bouncing, spell the word without looking at it. If he/she tires before all of the words have been spelled he/she may take a break before finishing. Meanwhile, the rest of the group will choose a jump rope and find a spot within the designated area to jump. It is important that each person be able to see the words as well as have enough space to jump rope without interfering with another person. Each person in the group has the option to jump rope, jog in place or perform jumping jacks while following the same procedure as they will on the mini trampoline with the exception that 'out loud' will be more of a whisper. The students may take a break any time they feel the need. Thirty minutes will be scheduled for this procedure, but time schedules will not be strictly enforced and are subject to change if the need arises. The students in this group may change from one motor skill to another at any time.

The time frame for each one hour session will be as follows:

- | | |
|-----------------------|-----------------|
| 1) Spelling Pre test | 05 - 10 minutes |
| 2) Treatment Groups | 20 - 30 minutes |
| 3) Action Games | 15 - 20 minutes |
| 4) Spelling Post test | 05 - 10 minutes |

Action games will consist of familiar circle games, relay races, dodge ball games, i.e. any games of low organization that are familiar to the entire group. These games will be played just for fun and to give the students something else to think about before taking the Post test.

It is my intent that the children have fun as well as benefit from being a part of the project.