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KINESTHETIC TEACHING METHODS IN THE TRADITIONAL
CLASSROOM
COMPARATIVE SPELLING AND VOCABULARY TECHNIQUES

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Education: Elementary

by
Everett E. Hambly, III
June 1996

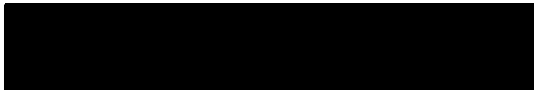
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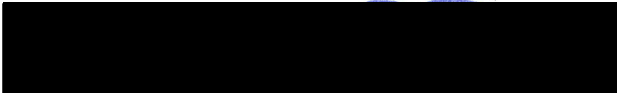
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June 1996

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ABSTRACT

Kinesthetic teaching methods as a factor relating to the ability of individuals to assimilate information (as indicated by spelling and vocabulary performance) was compared with visual teaching methods among 26 seventh-grade students (13 males, 13 females) who were Non Learning Disabled (NLD), in two morning Language Arts classes. This study employed the Single Subject -- Alternating Treatments Design (Barlow & Hayes, 1979) allowing comparison of the effectiveness of two intervention strategies (kinesthetic vs. visual).

Spelling and vocabulary performance as measured by pre-tests and post-intervention performance for the two strategies showed that average overall improvements resulted from the use of kinesthetic teaching methodologies when compared with visual (only) methods.

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CHAPTER ONE

Introduction:

The ability to retain and apply useful information is essential to the successful completion of high school and college for students in today's society. Not only is this ability critical to success in school, it is also necessary for those wishing to pursue careers today and in the future. Among the areas of knowledge most important to individuals wishing to succeed, communication skills and a command of the English language are vital. One particular aspect of communication and language skills that is indicative of the ability to retain and apply useful information is an individual's spelling and vocabulary abilities. Although the whole language movement has in some ways deemphasized the importance of teaching spelling and vocabulary as separate subjects, most educators would agree that no matter how they are taught, they are vital skills. Spelling and vocabulary mastery has often been characterized as an area of difficulty for many students (Vaughn, Schumm & Gordon, 1993).

Specific teaching methodologies which can enhance student performance in these areas would greatly benefit teachers and learners. One of the greatest challenges to teachers has been knowing which methodologies work better for particular students with unique learning

styles. This depends (to a great extent) on which of the students' senses (e.g., visual, auditory, tactile) provides the most direct inroad to learning. A significant amount of research has been conducted in an attempt to characterize strategies that are effective; however, depending on the purpose and goals of the study, and the specific target behaviors examined, results are somewhat inconclusive (Sear & Johnson, 1986). The purpose of this study is to determine whether or not there is a relationship between specific teaching methodologies and student performance in spelling and vocabulary. If such a relationship exists, specific teaching methodologies may then be generalizable to the teaching of other types of information for the purpose of enhancing student performance in other areas. With the advent of theories on Learning Styles and Multiple Intelligences, much more interest has been placed on the recognition by teachers of which types of "input" are most effective for different concepts with different students. Much of the current scholastic curriculum consists of media which is primarily visual in nature (textbooks, study guides, and worksheets). While some kinesthetic teaching methods are employed (most often in the area of note taking), their effectiveness appears to be underutilized and insufficiently understood. This research project will attempt to determine to what degree a

relationship exists between the act of writing something down (kinesthetic teaching method) and the ability of the individual to recall that information (thereby demonstrating cognitive learning and retention), using spelling and vocabulary skills as a test case.

Research Problem Statement:

Question -- Which method yields better scores/recall on spelling/vocabulary tests for seventh-grade students?

Method A (Visual): Providing words and definitions to students already pre-printed on paper for them, going over/reading aloud the spelling, pronunciation and definitions (reading the sheets to them), and then allowing them time to study these words; or

Method B (Kinesthetic): Requiring students to copy down the words and definitions in their own handwriting or printing with paper and pen as the teacher reads the words and definitions to the class orally.

Hypothesis:

Method B/Kinesthetic will result in improved scores/recall on spelling/vocabulary tests.

CHAPTER TWO

Literature Review:

A review of existing literature on the subject of kinesthetic teaching methods and their relationship to retention and application of information tends to support the theory that such a relationship exists. In the book, "Making Connections", research showed that:

[S]ome learners prefer information to be written; others prefer it to be spoken. Some need touching and physical manipulation; others are less concrete. However, we all have senses --and they all operate all the time. A safe general rule, therefore, is to ensure that all senses be engaged in the design of experiences for students, and that students need to have deep and rich sensory experiences of whatever is to be learned (Caine, 1991).

Studies indicate that in general, people tend to remember in accordance with the following percentages.

10 percent READING: This is probably the most often used technique for "furthering instruction". It appears to be on the lowest level of retention. One might wonder why there is such an emphasis on outside or correlated readings in instructional settings.

20 percent HEARING: The spoken word is the receiver's part of the lecture, which does not fare much

better than reading only.

30 percent SEEING: Seeing may be believing, but it is not remembering. One might well question the effectiveness of symbols, bulletin boards and other visualizations that are displayed but are not taught.

50 percent HEARING and SEEING: When these two are combined into one presentation, the percentages of retention are also apparently combined.

70 percent SAYING: By having the learner verbalize the information, the retention rate increases dramatically. This may be why the technique of having class members restate the lesson in their own words is so popular among seasoned educators.

90 percent SAYING and DOING: When both of these actions are utilized to learn something, the information gets to the highest retention rate so as to maximize assimilation and future application.

"While the figures above are only approximate and subject to exceptions, they do give an indication of how teaching techniques might be improved at all levels of instruction," (Ekwall, 1988).

Ekwall performed research relating to the use of kinesthetic teaching methods for spelling and their effect on student performance and achievement. According to Ekwall's Kinesthetic-Tactile modality approach to the teaching of spelling words, one should adhere to

the following procedure:

1. Begin this approach with nothing on the [index] cards and with the specific words to be taught on a small list beside you. Print the first word on a card, saying the part of the word as you write it. Then, say the word and have the student repeat it.

2. Have the student trace over the word several times using middle and index fingers. Be sure both fingers are in contact with the part being traced. Be sure the student says the word part while tracing it. Try to avoid emphasizing specific sounds.

3. As with other methods, have the student use the word in a sentence. If the student cannot, use it in a sentence yourself; then have the student use it in another sentence.

4. After the student has traced it several times, give the student a new card and have him or her attempt to write it from memory. If the student begins to make a mistake, stop him or her; repeat steps 1 through 4, and have the student attempt it again. Do not let the student write it wrong.

5. Allow time to review all words before stopping.

Other kinesthetic teaching methods which show a connection between kinesthetic/tactile representations and student achievement include use of STS (See The Sound) visual phonics whereby a system is taught which

associates each sound with a hand symbol and a graphic symbol. It is similar to sign language for the deaf, except the hand motions represent sounds, not letters or words.

STS links speech sounds to other senses in a progression from mouth movements, hand gestures which mirror the mouth movements, to written symbols. This method was used during reading instruction. Pre- and post-test data showed an overall trend toward greater progress by the students who were taught STS hand signs (Slauson, 1993).

In a study conducted from September, 1991 through February, 1992, 24 third-grade students received instruction for 35 to 40 minutes three to four days per week by teachers utilizing a V.A.K.T. (Visual And Kinesthetic-Tactile) method. Using the overhead projector, the daily letter-sound and/or sentence combination was presented. Students practiced in small groups at the chalkboard. The board provided the medium for children to see-say and to write-trace at their personal levels.

Although the third-grade level appears to be a good place to start this program, trying it sooner might keep some children from getting so far behind in the first place. Since more

successful students appeared to do exceptionally well with this approach, it might be introduced to them as an enriching curriculum early on so that they could get to the business of reading real literature and reference material sooner (Petrie, 1993).

By engaging the physical senses, it appears that learning can be enhanced for some individuals. The question might well be asked, is the group that would benefit the most from kinesthetic teaching methods the group with the greatest need?

Rita Dunn, in her article, *Strategies for Teaching Word Recognition to Disabled Readers*, concludes that "primary children and poorly achieving students of all ages tend to be (a) tactual or tactual/kinesthetic..., or (b) global... Tactual strengths suggest that touching, handling, and/or manipulating help in developing comprehension", (Dunn, 1992).

In other research, kinesthetic feedback was varied by asking children to trace simple and complex pictures and to use one of three tools to trace. The use of a pencil and a stylus both involved more fine motor coordination than the use of one's index finger for tracing the lines in the pictures. Children held tools very securely, and carefully traced along the lines in the pictures. Thus, there was a fair amount of effort

involved in producing responses, providing considerable kinesthetic feedback. Also, the use of the pencil, in contrast to the other methods, meant that there were more obvious visible consequences following the completion of the exercises, providing additional cues to facilitate discrimination performance.

Performance was typically good when tracing with a pencil (recall accuracy was 89 percent). Presumably, pencil tracing produced a considerable amount of information about kinesthetic feedback and visible consequences, thus increasing children's ability to identify pictures that were traced with a pencil (Foley, Aman, & Gutch, 1987).

"Teacher experience suggests that many students' mightiest modality is kinesthetic, and that as teachers we can build on their strongest learning mode with spelling activities that emphasize touch and movement as well as sight and sound", (Sisneros, Bullock, 1983).

"Always write a word first. Kinesthetic kids will really begin to see and hear a word only after their fingers and hands get into the act. They need to feel the shape of the word -- then they'll be able to spell it. Encourage students to write out the words they have trouble spelling whenever possible", (Barbe, Kreitner, Francis, & Marcuson, 1985).

"Physical variables, such as visual, kinesthetic, and auditory, tend to change with age. Primary-grade children tend to be more auditory than visual because their interaction with others primarily depends on speaking and listening. However, the visual and kinesthetic modalities become more dominant between late elementary grades and adulthood as students are expected to read and write more frequently", (Yong & McIntyre, 1992).

"In utilizing kinesthetic teaching methods, tactile/kinesthetic experiences have included such things as tracing vocabulary words, spelling words with sandpaper letters, illustrating word concepts with crayon or marker, and outlining word shapes on paper or in the air as the child looked at the word. Even though emphasis was placed on word recognition skills during the instructional sessions, children's comprehension ability also increased", (Worden, 1987). On both word recognition and comprehension, there was a significant difference between the kinesthetic and the control groups which supports the contention that kinesthetic teaching methods enhance learning.

Copying items provides students with a kinesthetic motor experience with each word. It is suggested that spelling is a visual activity and supports the contention that

a visual structure in learning is at work in spelling American English words. It is clear that methods of study are related to both recall and retention in spelling achievement and that visual imagery methods are associated with better performance than auditory imagery. In studies which have utilized copying methods and computer/typing programs, it was determined that both utilize common visual and kinesthetic factors (Sears, 1986).

In an extension of Hulme (1981) and Hulme, et al (1987), Cunningham and Stanovich (1990) examined the spelling acquisition of normal achieving (NLD -- Non-Learning Disabled) first-grade students trained in three motoric activities: computer typing, letter-tile manipulation, and handwriting. Handwriting appeared to be the most effective method of teaching spelling with this normal achieving group. Following the intervention, students were interviewed individually regarding which condition they liked best and which condition they thought helped them learn best. While both LD (Learning Disabled) and NLD students overwhelmingly chose the computer as the condition they liked most, students' responses to the question of which condition they thought helped them learn the best were quite different, favoring handwriting (Vaughn, 1993). This could be because

no matter what letter "key" is struck with the computer, or tile "key" is manipulated, the differentiation (for the student) between keys or tiles is by the visual letter printed on the key (only). Whereas, in handwriting the student must make physically different motor motions with his or her muscles (hand/arm), to form each distinctly different letter.

Hulme (1981; Hulme, Monk & Ives, 1987) has carried out an extensive series of studies demonstrating that the motoric activity involved in tracing or writing various stimuli can facilitate young children's memory performance. In two separate experiments, it was indicated that the writing condition resulted in performance significantly superior to that of both the tile condition and the computer condition (Cunningham 1990). The main concern seems to be the "educational trend" towards using computers more and more in the schools while getting away from "primitive" methods like handwriting (in favor of word processing). Cunningham's replication of Hulme's studies were intended to investigate the relationship between handwriting and learning as opposed to keyboarding and learning. Its purpose was to consider whether a greater emphasis on keyboarding with a decreased emphasis on handwriting could have an adverse impact (long range) on children's cognitive abilities, since there appears to be positive

correlation between kinesthetic methods (handwriting) and learning.

Much of the research is based on the assumption that learning and memory are based on the translation of information from either visual, verbal, or tactile-kinesthetic senses or mediums into mental codes. The study of transformability of the information from one code to another is a promising area of research in cognition. Studies indicate that it is possible to transform a verbal memory code [such as when a spelling word is "said" in a test] into a visual one: from the name of a letter, a visual representation can be produced, a process called "generation." The possibility of an equivalent ability for transforming tactile-kinesthetic information into a visual representation is less clear. In 1986, Kazen-Saad performed research which involved blindfolded subjects being given either verbal instructions (up, down, right, left) to mentally construct various patterns or tracing an equivalent wire pattern with their index finger. Pattern complexity ranged from five to six to seven segments. An interesting finding was the significant negative correlation ($p = .05$) between the number of correct recognitions per pattern and the number of segments for the verbal group, but not for the tactile-kinesthetic one. This result could suggest different central-processing requirements for verbal and

motor short term memory (Kazen-Saad, 1986). In other words, even though the verbal group started out better, as the complexity of the patterns increased, the verbal group's ability to "keep up" with the memorization task declined, while the tactile-kinesthetic group's recognition and recall abilities improved (on the more complex patterns).

Summary of Current Research:

Considerable evidence exists that there is a relationship between writing something down and learning it. By utilizing kinesthetic teaching methods and motoric activities, the individual is provided with an "experience" which then becomes easier to recall (than the less tangible and less experiential modes of audio or visual learning only without the kinesthetic component).

Research supports the hypothesis that there is an improvement in cognitive tasks when handwriting is utilized for input of information. By examining student performance and achievement on spelling and vocabulary tests, it is hoped that increased use of kinesthetic teaching methods in all educational disciplines might be justified, thereby enhancing success for students in all future endeavors.

CHAPTER THREE

Method:

To compare the effects of two or more treatments or intervention strategies, each treatment is usually administered to a different group of subjects, and differences are noted. Because considerable inter-subject variability exists in each group, problems may arise in generalizing results from individual subjects or group averages to a larger population. To avoid inter-subject variability, an ideal solution (although physically impossible) would be to divide one subject in two, and apply two different treatments simultaneously to each identical individual. This would eliminate inter-subject variability and allow the effects of specific intervention strategies to be directly observed. Such a procedure exists in the family of single-case experimental designs, although it has been little used and often confused. This procedure is known as the Alternating Treatments Design (Barlow & Hayes, 1979). It has the advantages of allowing one to compare the effectiveness of two or more teaching methods (or intervention strategies) on a single dependent variable (the student and his/her performance). For example, using this design, the teacher can compare the effects of two reading programs on a student's reading comprehension ability or the effects of two behavior

reduction procedures on a student's being disruptive.

Limitations:

With regard to the effects of Multiple Treatment Interference, the following question could be posed. Will the results of (Method) Treatment A in an Alternating Treatment Design (ATD), where it is juxtaposed with (Method) Treatment B, be the same as when Treatment A is applied in isolation? In other words, will the results of Treatment A be generalizable from the contrived experimental situation? This is no small issue, since the external validity or generalizability of the result is a major portion of any experimental inquiry. It is understandable that this issue should arise in an experimental design that features rapid alternation of treatments or conditions, as this is more unlike a real life situation. This issue must be put into perspective. Few would question the internal validity of the ATD or the ability of the design to support the research hypothesis. In fact, the testing of two treatments in the same subject within the same span of time produces one of the most elegant controls for most threats to internal validity. Because few applied behavioral researchers derive random samples, inference of results from a group to a population of individuals is not possible. Technically, an experiment, although internally valid, is generalizable

only to subjects with exactly the same set of characteristics. Because this would get us nowhere, researchers often guess which factors will affect generalizability and which will not in a given experiment and proceed accordingly. The messy area of applied research is fraught with Multiple Treatment Interference (Barlow & Hayes, 1979). Unlike the splendid isolation of animal laboratories, where rats are returned to their cages for 23 hours to await the next session, students who are the subjects of applied research are experiencing a variety of events before and between treatments. One subject may have recently lost a family member, another flunked an exam, a third had ended a relationship, and a fourth was mugged on the way to a session. It is possible that these subjects responded differently to treatment than otherwise would have been the case, and these historical factors account for some of the enormous inter-subject variability in between-group designs comparing two treatments. ATD's, on the other hand, attempt to control for this experience by dividing each subject in two and administering two or more treatments within (roughly) the same period of time (Barlow & Hayes, 1979). Thus, by utilizing the Alternating Treatments Design for this research project, the numerous confounding variables associated with comparing different sets of individuals to one another statistically and then

attempting to support a hypothesis based on probability significance of greater than 5% is removed. Instead, subjects are evaluated as individuals and a determination is made as to whether or not their performance is better when one specific teaching method has been utilized as opposed to another.

Subjects:

Twenty-six seventh-grade students participated in this study: 8 males from first period and 5 males from second period, and 8 females from first period and 5 females from second period. All participating students were Non Learning Disabled and were drawn from two morning Language Arts classes (first and second periods). These students were selected for two reasons: One, by selecting students who had morning Language Arts classes, time of day would be less of a factor in terms of assessing individual student spelling and vocabulary skills and any attendant improvements related to specific intervention strategies. In other words, by selecting students from these two classes, it would be more like they were all from the same class. Note: Within these classes, an attempt was made to select students who were representative of the larger population in terms of ethnic backgrounds, and who were also very regular in their attendance such that the likelihood of their availability for all

interventions and performance tests would be high. The second reason was that fourth period (although still a morning class--before lunch) is an Honors English class which was not the desired target pool from which study subjects would be drawn. Although the Alternating Treatment Design compares subjects only to themselves, the Honors English students were not representative of the general population, which might limit the generalizability of the results. Sixth period was a "regular" English class. However, since it is an afternoon class, the previously mentioned time of day factor made this class also an undesirable target pool from which study subjects could be drawn.

Procedures and Design:

Word Selection -- Spelling and Vocabulary words for the study were derived in the following manner: Eleven lists were extracted from Books 1 & 2 of RSVP (Reading, Spelling, Vocabulary, Pronunciation, by Norman Lewis, Professor of English Communications Department, Rio Hondo College, Whittier, California; AMSCO Publications). These books (RSVP 1 & 2) were selected for this project because at the test site they were considered to be representative of spelling and vocabulary words that every seventh grader ought to know. After the lists were extracted, they were numbered one through eleven. Numbers were then randomly drawn from a "hat" with the

first number drawn designated for the Pre-Test; the second number drawn designated for the First Intervention; the third drawn being used for the Second Intervention, and so forth up through the last number drawn being designated for the Tenth Intervention. Appendix C contains the spelling words and definitions, as used, for the pre-test and ten interventions. Participants were first given a spelling and vocabulary test with no prior intervention/instruction to determine overall baseline performance for each student (i.e., naturally good spellers vs. average spellers). Next, the interventions were administered as follows:

Schedule:

Participants were given their spelling/vocabulary words on Monday using either Method A (Visual) or Method B (Kinesthetic) as determined by the randomized schedule (see below), and tested on Tuesday. The second intervention for the week was administered on Wednesday (utilizing the method specified in the randomized schedule) with testing on Thursday. This process continued for five weeks for a total of 10 interventions. The randomized schedule for the study appears below.

Method - A A B A B A B B A B

Day of week - M W M W M W M W M W

Number of Method A's on Mondays = 2

Number of Method B's on Mondays = 3

Number of Method A's on Wednesdays = 3

Number of Method B's on Wednesdays = 2

By utilizing this randomized schedule, not only were the methods presented in a non patternistic manner, but the number of Method A's and B's were equitably balanced between Mondays and Wednesdays so as not to allow the day of the week to be a significant factor in the results. In other words, if most of the Method A's had fallen on Monday, and the results showed a pattern, it might be difficult to attribute such resultant pattern to the Method, since day of the week (Monday blahs) could have some effect.

Testing:

Spelling tests (for both intervention methods) were conducted by first orally reading each word and having students write/spell the words on a lined piece of paper. Then, Vocabulary skills were tested by distributing a list of numbered definitions and having the students "match" the number of the correct definition with each spelling word, writing the "definition number" to the right of the word.

Evaluation:

Tests were scored counting one point for each word spelled correctly and one point for each correct definition "match". A percentage was then established. For example, for 10 words there were a total of 20 points possible (10 for spelling and 10 for vocabulary). A student missing 3 spelling words but getting all vocabulary correct would get 17 out of 20, or 85% (each "point" being worth 5%).

CHAPTER FOUR

Results:

Results for student performance utilizing the two intervention strategies/teaching methodologies were somewhat varied. Although most students improved when the Kinesthetic teaching method was employed (Method B), as compared to their performance using the Visual (only) method (Method A), some students did not show an improvement. In fact, they did worse (on average). However, the students who did worse, did only a little bit worse while the students who improved, improved by twice as much. Students' test scores for all Method A interventions were first added together and then divided by the number of Method A interventions in which they had participated (not counting any absences). This provided a "Method A average" score (see Appendix B, Table B1). Next, students' test scores for all Method B interventions were averaged (see Appendix B, Table B2).

From these data, two statistics were derived -- Delta Score and Delta Percent. Delta Score was calculated by determining the difference in average scores comparing Method B to Method A.

Delta Percent was computed based on the percent of change between the Method A score and the Method B score (dividing Delta Score by Method A average). See Appendix B, Table B3 for comparison of results. Out of 26

students, 17 of them improved. This represents approximately 65% of the sample population. These students' test scores improved by an average of 16%. Some students' Method B averages improved by only 1 or 2 percent but others improved by 20%, 30%, or as high as 47.9%. Nine of the 26 students got worse. This represents 35% of the subjects. Their average decrease was about 7%. For a summary of the data, see Appendix B Table B4.

Discussion:

After analyzing the data, it is clear that most individuals (65%) improved by utilizing the Kinesthetic teaching method for Spelling and Vocabulary words. In fact, when the average scores for the entire group were compiled (subtracting those who did worse from those who improved), the total average improvement was equivalent to about 8%.

Additionally, the data were examined to determine whether or not gender played a significant role in test performance/results for one method over the other. It was found that 10 out of 13 females improved using Method B (Kinesthetic), and 7 out of 13 males improved using Method B.

The average improvement for these females was 16.3% (163.9/10), while the average improvement for males was 15.4% (108.1/7).

Conclusions:

After careful review of the test scores/performance utilizing both teaching methodologies (Visual vs. Kinesthetic), it is clear that the Research Hypothesis is supported, in that the majority of the subjects in the study showed definite improvement in their average results (using the Kinesthetic Method). This phenomenon may be related to the individual learning styles of the students involved. So, for teachers of seventh grade students, it may be advisable to structure in-class activities such that students will be required to write down important information which must be learned (as opposed to handing it to them preprinted). This will enhance their ability to recall such information. Teachers, however, should recognize that some of their students are more Visual than Kinesthetic (approximately 35%) as shown in Table B4.

Therefore, educators should not utilize Kinesthetic teaching methods exclusively (such that other methods are precluded). Instead, a well rounded repertoire of teaching methodologies should be employed, recognizing the critical importance of Kinesthetic teaching methods and the relationship which exists between the act of writing something down and the ability of that person to learn and later recall that information. Finally, one may be inclined to interpret the results of this

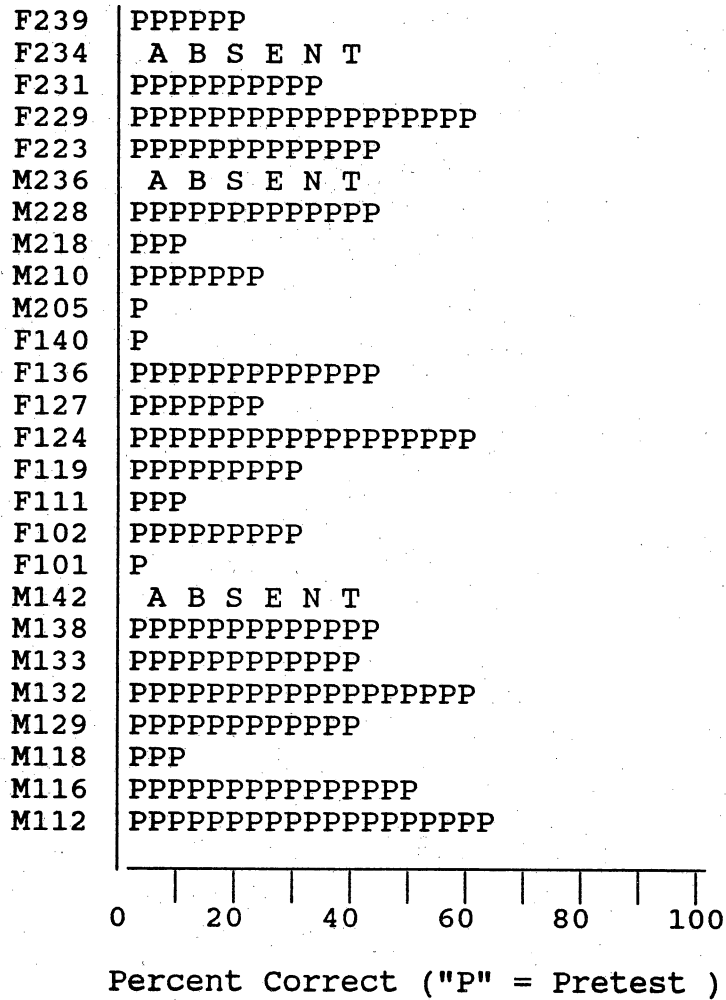
to suggest that seventh grade girls may be slightly more predisposed to Kinesthetic learning than seventh grade boys. This interpretation might be implied based on the fact that 77% of the females in this study (10 out of 13) showed improvement utilizing the Kinesthetic teaching methodology for Spelling and Vocabulary skills, while only 54% of the males (7 out of 13) showed similar improvement. However, more research would be required in this area in order to determine whether or not seventh grade girls do better with Kinesthetic learning than boys. As a follow-on to this study, further research is needed to determine whether or not the Kinesthetic teaching methodologies which were utilized for Spelling and Vocabulary words would enhance student performance in other areas. Such a study might include a comparison of student test scores in a Social Studies class where they were required to take notes in one instance (Kinesthetic teaching methodology), and not in another.

APPENDIX A
Student Performance

GRAPH A (PT)

Baseline Data (Pre-Test)

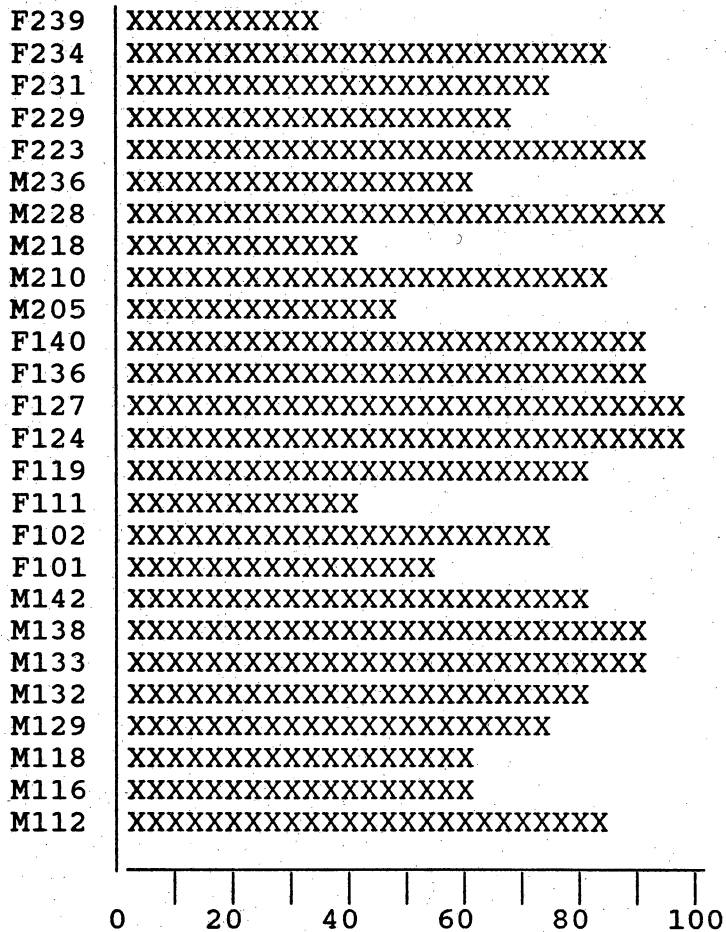
Student



GRAPH A 1

Test Results - First Intervention

Student



Percent Correct
("X" = Visual, "0" = Kinesthetic)

GRAPH A 2

Test Results - Second Intervention

Student

F239	XXXXXXXXXXXXXXXXXXXXXXX
F234	XXXXXXXXXXXXXXXXXXXXXXX
F231	XXXXXXXXXXXXXXXXXXXXXXX
F229	XXXXXXXXXXXXXXXXXXXXXXX
F223	XXXXXXXXXXXXXXXXXXXXXXX
M236	XXXXXXXXXXXXX
M228	XXXXXXXXXXXXXXXXXXXXXXX
M218	XXXXXXXXXXXXX
M210	XXXXXXXXXXXXXXXXXXXXXXX
M205	XXXXXXXXXX
F140	XXXXXXXXXXXXXXXXXXXXXXX
F136	A B S E N T
F127	XXXXXXXXXXXXXXXXXXXXXXX
F124	A B S E N T
F119	XXXXXXXXXXXXXXXXXXXXXXX
F111	XXXXXXXXXXXXXXXXXXXXXXX
F102	XXXXXXXXXXXXXXXXXXXXXXX
F101	XXXXXXXXXXXXXXXXXXXXXXX
M142	XXXXXXXXXXXXXXXXXXXXXXX
M138	XXXXXXXXXXXXXXXXXXXXXXX
M133	XXXXXXXXXXXXXXXXXXXXXXX
M132	A B S E N T
M129	XXXXXXXXXXXXXXXXXXXXXXX
M118	XXXXXXXXXXXXXXXXXXXXXXX
M116	XXXXXXXXXXXXX
M112	XXXXXXXXXXXXXXXXXXXXXXX

0 20 40 60 80 100

Percent Correct
("X" = Visual, "0" = Kinesthetic)

Test Results - Third Intervention

F239	00000000000000000000000000000000
F234	00000000000000000000000000000000
F231	00000000000000000000000000000000
F229	00000000000000000000000000000000
F223	00000000000000000000000000000000
M236	00000000000000000000000000000000
M228	00000000000000000000000000000000
M218	00000000000000000000000000000000
M210	00000000000000000000000000000000
M205	00000000000000000000000000000000
F140	00000000000000000000000000000000
F136	00000000000000000000000000000000
F127	00000000000000000000000000000000
F124	00000000000000000000000000000000
F119	00000000000000000000000000000000
F111	00000000000000000000000000000000
F102	00000000000000000000000000000000
F101	00000000000000000000000000000000
M142	00000000000000000000000000000000
M138	00000000000000000000000000000000
M133	00000000000000000000000000000000
M132	A B S E N T
M129	A B S E N T
M118	00000000000000000000000000000000
M116	00000000000000000000000000000000
M112	00000000000000000000000000000000

0

100

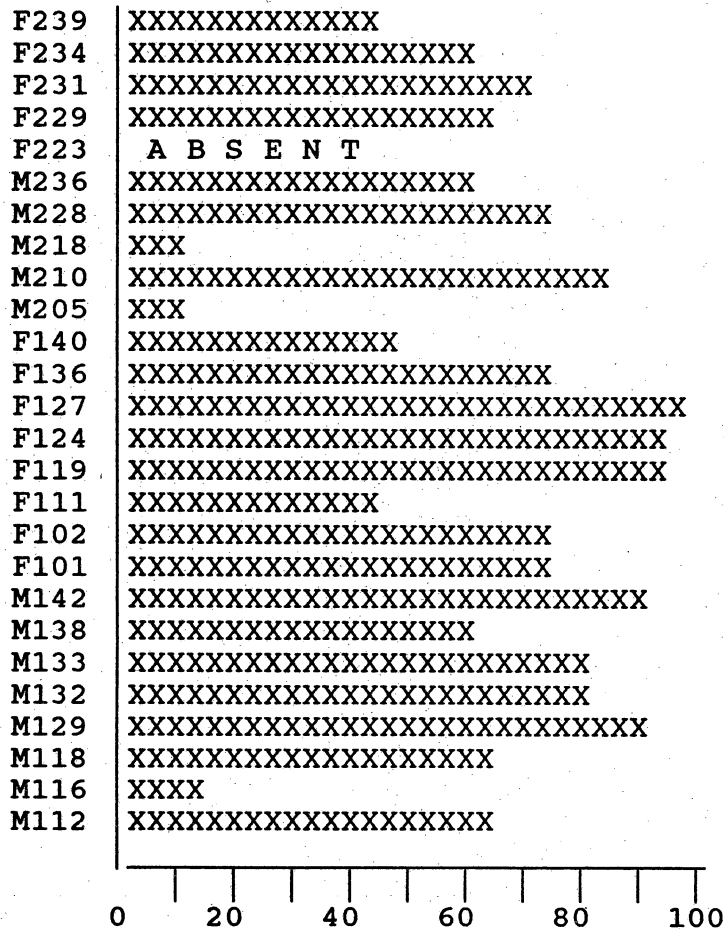
020406080100

31

GRAPH A 4

Test Results - Fourth Intervention

Student

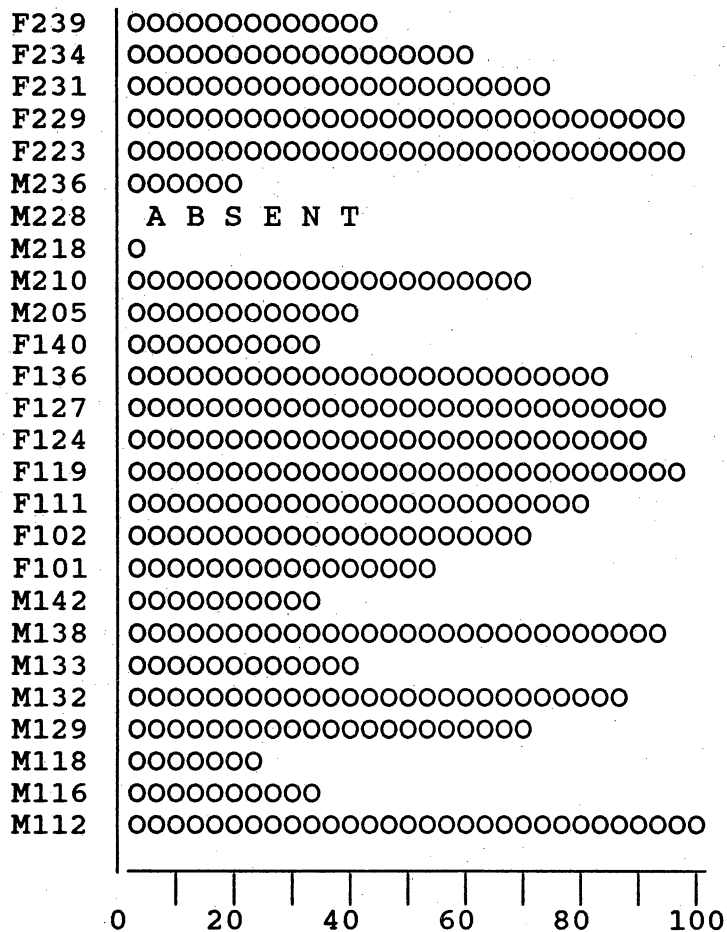


Percent Correct
("X" = Visual, "0" = Kinesthetic)

GRAPH A 5

Test Results - Fifth Intervention

Student

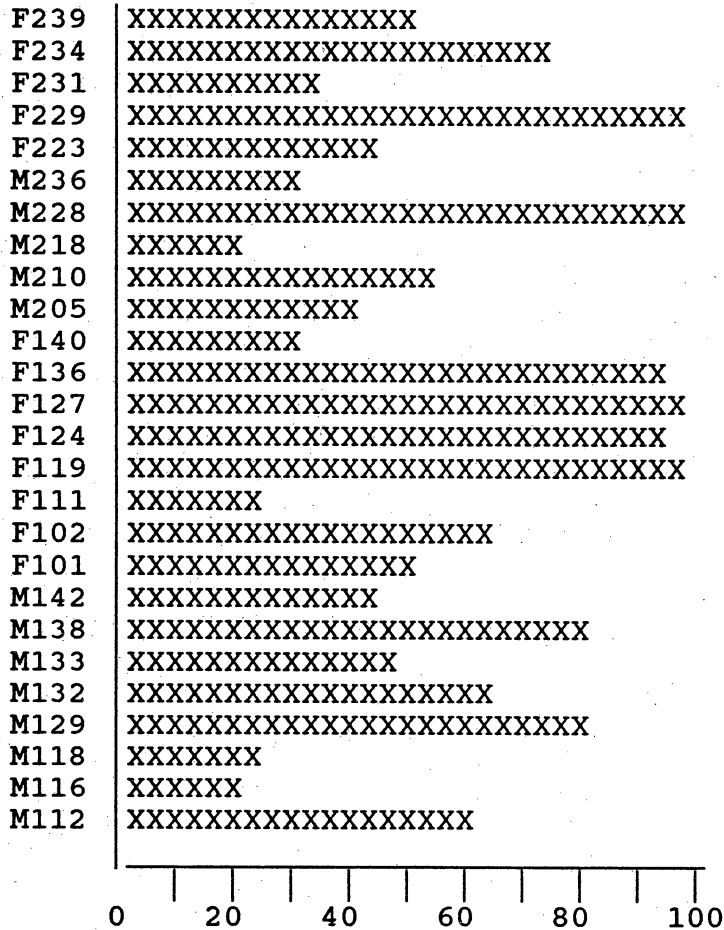


Percent Correct
("X" = Visual, "O" = Kinesthetic)

GRAPH A 6

Test Results - Sixth Intervention

Student



Percent Correct
("X" = Visual, "0" = Kinesthetic)

GRAPH A 7

Test Results - Seventh Intervention

Student

F239	0000000000
F234	000000000000000000000000000000
F231	000000000000000000000000000000
F229	0000000000000000000000000000000
F223	0000000000000000000000000000000
M236	0000000000000000000000000000000
M228	0000000000000000000000000000000
M218	0000000000000000000000000000000
M210	0000000000000000000000000000000
M205	0000000000000000000000000000000
F140	0000000
F136	0000000000000000000000000000000
F127	00000000000000000000000000000000
F124	0000000000000000000000000000000
F119	0000000000000000000000000000000
F111	0000000000000000000000000000000
F102	0000000000000000000000000000000
F101	0000000000000000000000000000000
M142	0000000000000000000000000000000
M138	00000000000000000000000000000000
M133	0000000000000000000000000000000
M132	0000000000000000000000000000000
M129	0000000000000000000000000000000
M118	0000000000000000000000000000000
M116	0000000000000000000000000000000
M112	0000000000000000000000000000000

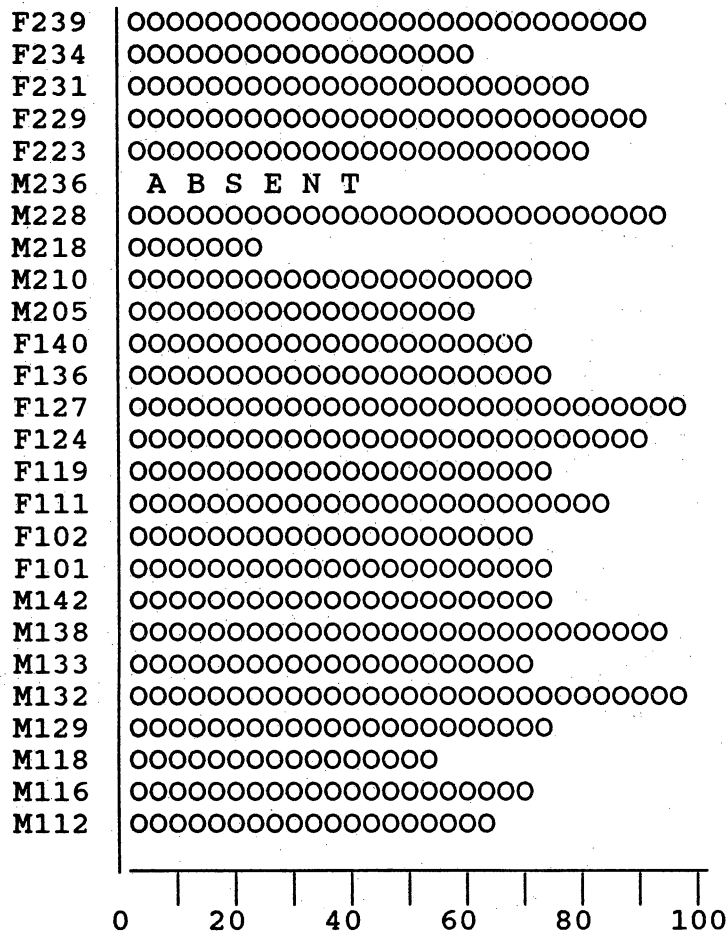
0 20 40 60 80 100

Percent Correct
("X" = Visual, "0" = Kinesthetic)

GRAPH A 8

Test Results - Eighth Intervention

Student

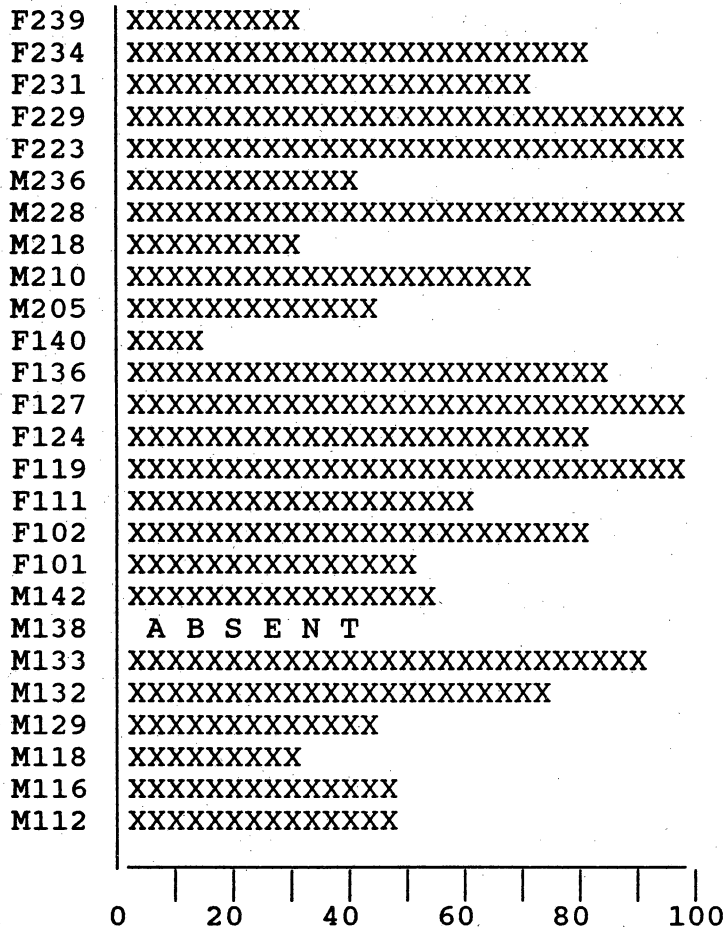


Percent Correct
("X" = Visual, "0" = Kinesthetic)

GRAPH A 9

Test Results - Ninth Intervention

Student



Percent Correct
("X" = Visual, "0" = Kinesthetic)

APPENDIX B
Intervention Comparisons

TABLE B 1

Method A -- Visual (Average)

Combined Average for all Method A Test Scores	
Student	
F239	47
F234	79
F231	67
F229	82
F223	80
M236	51
M228	92
M218	28
M210	75
M205	44
F140	57
F136	61.3
F127	100
F124	92.5
F119	92
F111	48
F102	75
F101	64
M142	73
M138	81.3
M133	78
M132	75
M129	73
M118	46
M116	40
M112	68

TABLE B 2

Method B -- Kinesthetic (Average)

Combined Average
for all Method B
Test Scores

Student	
F239	54
F234	72
F231	72
F229	96
F223	91
M236	56.3
M228	91.3
M218	26
M210	74
M205	52
F140	61
F136	88
F127	97
F124	94
F119	90
F111	71
F102	76
F101	70
M142	66
M138	93
M133	61
M132	92.5
M129	66.25
M118	47
M116	53
M112	73

TABLE B 3

Method A vs. Method B Results

Student	Delta Score	Delta Percent
F239	+ 7	+14.9%
F234	- 7	- 8.9%
F231	+ 5	+ 7.5%
F229	+14	+17.1%
F223	+11	+13.8%
M236	+ 5.3	+10.3%
M228	- .7	- 0.9%
M218	- 2	- 7.1%
M210	- 1	- 1.3%
M205	+ 8	+18.2%
F140	+ 4	+ 7.0%
F136	+26.7	+43.5%
F127	- 3	- 3.0%
F124	+ 1.5	+ 1.6%
F119	- 2	- 2.1%
F111	+23	+47.9%
F102	+ 1	+ 1.3%
F101	+ 6	+ 9.3%
M142	- 7	- 9.6%
M138	+11.7	+14.4%
M133	-17	-21.7%
M132	+17.5	+23.3%
M129	- 6.8	- 9.2%
M118	+ 1	+ 2.1%
M116	+13	+32.5%
M112	+ 5	+ 7.3%

Delta Score = Difference in average scores comparing Method B to Method A (Example: Method A avg = 80, Method B avg = 84, Delta Score = +4. Method A avg = 80, Method B avg = 76, Delta Score = -4.)

Delta Percent = Calculated by dividing Delta Score by Method A average to determine the percent of change in the Method B average. (Example: Method A avg = 68, Method B avg = 73, Delta Score = +5, Delta Percent = 5 divided by 68 = 7.3% therefore, 5 is 7.3% of 68.)

TABLE B 4
Data Summary

Student	Percent Improved	Student	Percent Worse
F239	+14.9%	F234	- 8.9%
F231	+ 7.5%	M228	- 0.9%
F229	+17.1%	M218	- 7.1%
F223	+13.8%	M210	- 1.3%
M236	+10.3%	F127	- 3.0%
M205	+18.2%	F119	- 2.1%
F140	+ 7.0%	M142	- 9.6%
F136	+43.5%	M133	-21.7%
F124	+ 1.6%	M129	- 9.2%
F111	+47.9%		
F102	+ 1.3%		
F101	+ 9.3%		
M138	+14.4%		
M132	+23.3%		
M118	+ 2.1%		
M116	+32.5%		
M112	+ 7.3%		
<hr/>			
Total Improved	Total of "+"s	Total Worse	Total of "-"s
17	272	9	63.8
Percent of total Students	Average Improvement (272 / 17)	Percent of total Students	Average Decrease (63.8 / 9)
65.3%	+16%	34.6%	- 7.08%

Total Overall Average Improvement:

$$272 \text{ ("+"s)} - 63.8 \text{ ("-"}s) = 208.2$$

$$208.2 \text{ divided by } 26 \text{ (total sample population)} = + 8.0\%$$

APPENDIX C

Spelling and Vocabulary Words

List I - Spelling and Vocabulary Words
for Pre-Test

(From Book 2 - RSVP/AMSCO)

cordial	- friendly; sincere; warmhearted.
entice	- draw; attract; coax; tempt.
gratitude	- feeling of thankfulness or appreciation.
indignant	- feeling angry and annoyed because of something disgraceful.
magnificent	- grand; splendid; wonderful in appearance.
relentless	- mercilessly hard or harsh; also not giving in to appeals for pity.
responsible	- having something to one's credit or to one's blame.
submitted	- gave to someone for further work; presented for judgment; gave in; accepted control from someone stronger.
triumphed	- was successful (in); also, got the better (of).
urge	- argue for; ask seriously for something important.

List II - Spelling and Vocabulary Words for
1st Intervention

(From Book 1 - RSVP/AMSCO) Method A (Visual)

- | | |
|-------------|---|
| appealed | - made a serious request |
| circulation | - movement through or around a certain place. |
| encourage | - inspire with courage, desire, or hope. |
| government | - people who are entrusted with the control of a country, state, city, etc. |
| interfere | - get in the way; try to stop. |
| luxury | - ease and richness; something beyond the necessities of life. |
| measurement | - the act of finding out the size of something by means of a ruler or other instrument. |
| patiently | - in a manner showing willingness to wait a long time for effects. |
| received | - got from someone. |
| weird | - strange and not human; ghostly. |

List III - Spelling and Vocabulary Words for
2nd Intervention

(From Book 1 - RSVP/AMSCO) Method A (Visual)

believe	- accept as true.
designed	- planned; made for a certain reason.
excellent	- very good; unusually fine.
importance	- great value or necessity.
neighbor	- a person or country that is nearby.
preceding	- earlier in time or place; previous.
remainder	- the rest; what is left.
similar	- like; almost the same as.
valuable	- of great importance or use.
yield	- give in; surrender.

List IV - Spelling and Vocabulary Words for
3rd Intervention

(From Book 1 - RSVP/AMSCO) Method B (Kinesthetic)

- assigned - given out.
- contribution - something given at a time when others are also giving.
- fermentation - change in a liquid, as when milk sours, or when sugar or other substances turn into alcohol.
- industrious - hard-working.
- nourishment - food necessary for life and growth.
- resents - does not like; is angry and hurt because of; feels injured or offended by (someone or something).
- splendid - magnificent; excellent; wonderful.
- successful - getting what one wants or hopes for; coming about or turning out in a way that is good or favorable.
- vigor - physical or mental strength or energy.
- withstand - resist; be able to hold one's own against.

List V - Spelling and Vocabulary Words for

4th Intervention

(From Book 2 - RSVP/AMSCO) Method A (Visual)

- | | |
|---------------|--|
| absolutely | - perfectly; completely; certainly. |
| appropriately | - in the proper way; suitably; in a fit manner. |
| disputes | - arguments; quarrels; questions on which people do not agree. |
| incline | - slant; sloping surface; hill. |
| instrument | - a tool; something used for a particular purpose; a musical device. |
| objections | - reasons against something; feelings that something is not right or should not be done. |
| proclaim | - make known publicly; declare to everyone. |
| reputation | - general opinion held of a person, animal, place, thing, etc.; what one is known for. |
| shirking | - purposely neglecting (duties, work, responsibility, etc.). |
| terrorize | - fill with great alarm or fear; frighten thoroughly. |

List VI - Spelling and Vocabulary Words for
5th Intervention

(From Book 2 - RSVP/AMSCO) Method B (Kinesthetic)

- acknowledged - admitted; recognized; accepted as true.
- considerable - not small; large in quantity.
- existence - living; being alive; life.
- interrupts - breaks in on (someone's) activity, work, conversation, etc.
- promptly - quickly; soon; almost at once.
- relieved - released from pain, fear, worry, or anxiety.
- sincerely - honestly; truthfully; really.
- succeeded - reached the happy or favorable end of an undertaking; won out.
- uncommonly - unusually; in a way out of the ordinary.
- worthy - deserving; having the right; having the goodness or value.

List VII - Spelling and Vocabulary Words for
6th Intervention

(From Book 2 - RSVP/AMSCO) Method A (Visual)

- | | |
|--------------|--|
| anxiety | - mental uneasiness arising from fear or worry. |
| compelled | - forced. |
| experiencing | - feeling; living through. |
| indifferent | - not caring; little concerned about something; feeling no interest. |
| mysterious | - secret, hidden, or unexplained. |
| reluctant | - unwilling; preferring not to do something. |
| resolutely | - in a determined way with a fixed purpose. |
| suspicious | - feeling or imagining that something is wrong; distrustful; having or showing doubt. |
| tormentors | - those who cause extreme mental/physical suffering; those who tease, annoy or cause pain. |
| traitor | - a person guilty of betraying his family, friends, country, etc. |

List VIII - Spelling and Vocabulary Words for
7th Intervention

(From Book 2 - RSVP/AMSCO) Method B (Kinesthetic)

- | | |
|-------------|---|
| betrayed | - proved unfaithful or false to; also, gave over secretly to the enemy. |
| dependent | - relying on someone or something for help or support. |
| furios | - very angry; in a rage; also, showing great force. |
| honors | - treats with respect, politeness and love. |
| journey | - a trip from one place to another. |
| necessity | - great need; anything one absolutely cannot do without. |
| separately | - in different ways from one another; not together; apart. |
| treacherous | - betraying a trust; not to be trusted. |
| uncertainty | - lack of sureness. |
| wounded | - hurt or injured by violence or in an attack. |

List IX - Spelling and Vocabulary Words for
8th Intervention

(From Book 2 - RSVP/AMSCO) Method B (Kinesthetic)

acquired	- gained or obtained, usually by effort.
circumstances	- conditions; state of affairs.
gradually	- slowly; little by little.
mechanical	- done or worked by machinery; hence, not real or natural.
possession	- ownership; having as one's own or under one's control.
precautions	- care or safety measures taken beforehand to prevent loss, harm, etc.
reprove	- scold; find fault with; speak to in a way that shows disapproval.
startled	- surprised and a little scared.
tempted	- attracted; drawn to something pleasant; feeling that one would like to do something.
vanishing	- fading from sight.

List X - Spelling and Vocabulary Words for
9th Intervention

(From Book 1 - RSVP/AMSCO) Method A (Visual)

astonished	- surprised; amazed; struck with wonder.
companions	- friends; those who play with you.
description	- kind; sort; also, act of giving an account of something.
foreign	- belonging to another nation or country.
inheritance	- property or money that one receives from someone who has died.
mention	- brief reference; a short statement.
production	- making or turning out something.
repents	- feels sorrow on account of something one has done.
summoned	- gathered up; called forth; called together.
wander	- move about with no definite purpose.

List XI - Spelling and Vocabulary Words for

10th Intervention

(From Book 1 - RSVP/AMSCO) Method B (Kinesthetic)

- attention - the fixing of one's thoughts closely on something.
- commence - make a start; begin.
- domesticated - tamed; accustomed to living among human beings.
- guarding - protecting; watching over.
- necessary - not to be done without; needing to be done.
- poisonous - causing illness, harm or death.
- registered - had their names entered on a list or in a record book.
- special - unusual; uncommon.
- surrounding - enclosing on all sides.
- views - opinions, ideas, thoughts; also, acts of seeing, or things you see.

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