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Effects of Auditory Perceptual Training on Reading Decoding

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Running head: AUDITORY PERCEPTION

Abstract

The purpose of this experimental study was to determine the effect of auditory perceptual training on reading decoding skills of adolescent students with learning disabilities. The subjects (N=4) were all being served in a self-contained high school setting. Three of the subjects were male and one was female. The subjects were pre-tested and post-tested using the Test of Auditory Analysis Skills (TAAS) and word identification and word attack subtests of the Woodcock Reading Mastery Test-Revised(WRMT-R). The data were analyzed using dependent sample t-tests. Significant differences were found on auditory skills ($t= -3.66$, $p<.05$), word attack ($t=8.3$, $p<.05$) and the basic skills cluster ($t=5.14$, $p<.05$). Two limitations of this study were the small number of subjects and duration of the training exercises. Future studies with a larger sample and longer training period are recommended. Another recommendation is to use a single subject method when the sample size is this small.

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In loving memory of Nannie, Poppop, and Grandpa Marshall. I would like to dedicate this thesis in memory of them. They played a significant part in my life in which I love them and will always remember them for the role they played in my life. God Bless You.

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Auditory skills are important in the school environment. These skills are especially important in reading, language development, comprehension, and communication (Gillet, 1993). Individuals with reading decoding problems have been found to have auditory perceptual deficits. Lerner (1988) defined auditory perception as the ability of recognizing and/or interpreting what is being heard. Auditory perception skills have an impact on processes such as recognition, identification, discrimination, localization, analysis and synthesis of words, and short term and long term memory (Gillet, 1993). Watson and Miller (1993) supported this through their findings in a study conducted on college students with reading impairments. These individuals performed poorly on a variety of auditory perceptual tasks such as word attack and word identification skills. McGivern, Berka, Languis, and Chapman (1991) in a study which used the Seashore Rhythm Test, found children with reading impairments had more difficulty on the auditory discrimination patterns than efficient readers.

Several researchers have examined the relationship between auditory perceptual ability and reading ability. Training in the area of auditory perceptual skills can enhance reading skills of individuals with reading difficulties (Rosner, 1993). Individuals with auditory deficits have been studied at all ages in relation to reading disabilities. Gillet (1993) expressed the idea that auditory perceptual skills play a key role in reading ability. In addition, having adequate auditory processing skills enhances a reader's ability to

distinguish between similarities and differences in sounds, to recognize a sound within a word, to blend sounds, and to divide words into syllables.

Auditory Perceptual Skills

Students may have deficits in several auditory perceptual skills. Some auditory perceptual deficits may pertain to a student's ability to retain, recall, and repeat sounds. Additional auditory perceptual skills are necessary to acquire adequate reading skills. Some of these abilities are the ability to isolate sounds from many different sounds, the ability to bring sounds together that are coming into the ears and making one unified meaning, and the ability to recognize beginning, middle, and ending positions of a word (Gillet, 1993).

Lerner (1988) added to this by dividing auditory perception into five subgroups: phonological awareness, auditory discrimination, auditory memory, auditory sequencing, and auditory blending. Phonological awareness deals with the knowledge that words can be divided into syllables and phonemes; an important skill to have to acquire adequate reading skills. Auditory discrimination is the ability to discriminate between sounds and to identify whether words sound the same or different. Auditory memory is the ability to store and retrieve what has been heard. Auditory sequencing is remembering items in order. Auditory blending takes place when the individual blends single phonic sounds to complete a word. The mastery of these skills is of main importance in the learning processes. Rosner (1993) asserted that auditory perception is a skill which develops early in a child's life. Additionaly, auditory perception is explained as the skill to receive and apprehend sounds and words (Gillet, 1993).

According to Rosner (1993) around the age of eleven, an individual's development of auditory perceptual skills is close to complete. Although a great amount of fundamental reading skills are developed before the age of eleven there is an increase in reading ability as a student advances through school. However, if an individual has an auditory perceptual deficit, he/she may fall behind in areas such as word attack and spelling skills (Dietrich, 1994). These auditory perceptual skills and/or deficits play a major role in the school environment especially in reading, language development, and comprehension (Gillet , 1993). Rosner (1993) supported the idea that direct auditory perceptual skills training may increase reading decoding ability in individuals exhibiting reading deficits. This training can be done appropriately through direct instruction and the use of current material from the classroom.

Relationship of Phonological Skills and Auditory Perceptual Skills

Dietrich (1994) stated that phonological skills do appear to be of great significance to the reading process. A lack of adaquate phonological awareness skills makes it difficult to comprehend the relationship between letters and speech sounds. If this deficit occurs the individual may have poor decoding and word recognition skills (Catts, 1991). Research has shown that children who fail to acquire adequate skills in the areas of phonological segments and a knowledge of these segments in relation to reading may fall significantly behind their peers in reading (Brady, 1991). Gillet (1993) stated that students with reading disabilities that have fallen behind their peers may have a difficult time grasping phonics as a reading instruction method. Phonics difficulty may

be due to the severity of their auditory perceptual deficit. Kamhi and Catts (1991) stated that children with reading difficulties in the area of processing phonological information may have this problem due to problems with auditory perceptual processing. A study by Nix and Shapiro (1986) supporting Kamhi and Catts study compared able and disabled readers in the area of auditory perceptual processing using a battery of tasks. The battery of tasks were administered to 70 children. The set of tasks covered auditory discrimination, auditory analysis and synthesis, auditory sequential memory, and phonemic segmentation tasks. Seventy-five percent of the students being served in a resource room setting and ninety percent of the students being served in a self-contained setting failed the previously mentioned tasks. Results from this study revealed auditory perceptual processing problems to be observable in many individuals with reading disabilities. Nix and Shapiro stated that auditory perceptual processing problems have been documented as affecting such tasks as reading and spelling.

A more recent study conducted by Stone and Brady (1995) supported findings of Nix and Shapiro. Stone and Brady compared 30 third grade impaired readers with 30 younger children of equal reading level and with 30 same age children with normal reading skills. The researchers tested the students using the Peabody Picture Vocabulary Test- Revised (PPVT-R), the Block Design subtest of the Wechsler Intelligence Scale for Children-Revised (WISC-R), and the subtests Word Attack and Word Identification from the Woodcock Reading Mastery Test-R(WRMT-T). Stone and Brady examined their phonological ability and the extent it played in the development of reading skills. The subjects' phonological processing ability was measured in the following areas: word

span, pseudo-word imitation, and a working memory task. The less skilled readers' scores on pseudo-word imitation and word span were lower in comparison to the other two groups. An explanation for the lower scores on the pseudo-word imitation might be found in the low scores received on the Word Attack and Word Identification subtests of the WRMT-R. Results from this study supported that less skilled readers have phonological deficits.

Watson and Miller (1993) conducted a comparative study with ninety-four undergraduate students. Of this ninety-four, twenty-four were students with reading disabilities. Their study compared the subjects' skills in reading, auditory perception, and phonological processing. Using different standardized tests such as Woodcock Johnson Psychoeducational Battery - Revised (Woodcock Johnson - R), Woodcock Reading Mastery Tests-Revised(WRMT-R), Culture Free Intelligence Test, and Test of Basic Auditory Capabilities(TBAC), the following abilities were measured: intelligence, reading, "simple" auditory discrimination, nonverbal auditory temporal processing, speech perception, short and long term auditory memory, phoneme segmentation, and speed of retrieval. Analysis of the test results showed a significant difference between the subjects with reading disabilities and without reading problems. However, Watson and Miller's study did not reveal a significant relationship between nonverbal auditory processing and phonological abilities.

A study conducted by Fox and Routh (1980) examined the phonemic analysis skills of 45 first grade children with average intelligence. The forty- five children were divided into three groups, one group of average readers, one group with mild reading

difficulty, and one with severe reading difficulty. Results showed that the group exhibiting severe reading disability also revealed a large deficit in the area of phonemic analysis. This group also exhibited severe difficulty in the ability to segment spoken syllables into individual speech sounds when compared to the other two groups. In another study similar to Fox and Routh's study, the researchers examined 209 first graders on their development of reading and phonological processing ability. The first graders were tested at the beginning of first grade and at the end of first grade. The subjects were divided into 3 groups labeled with reading disabilities, without reading disabilities, and "garden variety" poor readers. The researchers tested the students in phonological processing, reading ability, and intellectual ability. What the researchers found was that the disabled readers and the "garden variety" readers scored similarly on all tasks. The researchers believed, as a result of this study, that if at the preschool or kindergarten level, individual phonological processing skills are tested, educators can better predict those individuals who are at risk of reading disabilities. This study reinforced the notion that poor phonological processing skills are associated with difficulties in reading (Huford et al., 1993).

In a study conducted by Mann (1993) the findings supported the conclusions of Huford et al. conclusion. Mann's longitudinal study investigated phoneme awareness and how this awareness predicted reading ability. One hundred kindergarten students were assessed using two group-administered phoneme assessment tests. The phoneme awareness tests as described by the researcher required an individual to delete, count, or substitute phonemes in a given word. One year later the same students were administered

the Woodcock Reading Mastery Test-Revised(WRMT-R) subtests word attack and word identification and part of the Wechsler Intelligence Scale for Children-Revised(WISC-R). Mann concluded that phoneme awareness is a good predictor of reading ability.

Very few studies have been conducted to examine the relationship between phonological skills and auditory perception and the impact of these skills on reading. Watson and Miller(1993) found a relationship between auditory perception and phonological ability. Watson and Miller stated that if auditory perception was related to certain areas of phonological skills in relation to reading, then the reading process is strongly affected by auditory perceptual skills. Thus Watson & Miller (1988, 1993) concluded that auditory perception may have an indirect relationship to reading ability.

Reading Decoding and Auditory Perceptual Skills

Between 75% to 95% of individuals with learning disabilities have a reading disability (Bateman, 1991). An individual with a reading disability reads at a significantly lower level than his or her peers (Bateman, 1991). Three main areas of auditory processing are discrimination of phonemes within words, auditory discrimination of words , and auditory synthesis. Deficits in these areas of auditory processing could have a negative impact on reading development. Some difficulties exhibited are recognizing the differences and similarities between the beginning sound and the ending sounds of words, and difficulty distinguishing similarities in words. For example, "fat" and "pat" may be confused. Trouble in hearing consonant blends, deficiency in discriminating short vowel sounds (example "ten, tin, ton"), trouble in separating words into syllables, and difficulty in remembering sounds for written letters

and/or words are other areas that may cause problems. The lack of these auditory processing abilities could have a negative effect on the development of word attack skills (Gillet, 1993).

Several researchers have explored variables that may contribute to reading disabilities. McGivern, Berka, Languis, and Chapman (1991) conducted a study using a group of children in grades first through third who had reading disabilities. These students were identified as having two basic difficulties: below average reading ability and frequent reversals of phonemes. Using the Seashore Rhythm Test, which tests auditory rhythmical patterns, the researchers found children with reading difficulties had lower abilities in discriminating auditory patterns. These findings supported past studies in which reading impairments were related to a deficit in auditory temporal patterning. The researchers suggested that phoneme reversals may be related to both reading impairments and auditory temporal pattern discrimination. McGivern, et al. (1991) defined auditory temporal pattern discrimination as the rate of processing information that is presented either in a verbal or nonverbal manner. The results of this study also emphasized a greater importance of training in the area of auditory temporal pattern recognition as a means of adding improvement in reading performance.

A study conducted by Watson(1992) supported the findings of McGivern, et al. Watson's study explored the possibility of a relationship existing between a deficit in auditory temporal processing and poor reading ability. The study used 20 reading disabled college students and 10 math disabled college students. A relationship was found to exist between reading disabilities and auditory temporal processing abilities.

Bateman (1991) found that individuals did not learn auditory processing skills by just reading. They learned these skills systematically through direct instruction in reading. Students with reading disabilities may increase their reading level to, at or above their predicted level with proper reading instruction (Bateman, 1991).

A study by Shapiro, Nix, and Foster (1990) examined 206 second and third grade children. Half of these subjects were able readers, and half were with reading problems. The researchers investigated the following skills: advanced phonological awareness, auditory sequential memory, discrimination, and simple phonological awareness. Some of the advanced phonological abilities analyzed were phoneme deletion and segmentation, and sequential memory abilities. The tests used to evaluate these four areas were Lindamood Auditory Conceptualization Test (LAC test), Weschler Intelligence Scale for Children-Revised (WISC-R), Detroit Tests of Learning Aptitude, and Auditory Analysis Test. The LAC Test measured both auditory discrimination and analysis and synthesis abilities. WISC-R and the Detroit Tests of Learning Aptitude measured auditory sequential memory. The subjects in the study performed poorly in the areas of phonological awareness and auditory sequential memory. Shapiro, Nix and Foster concluded from the results of the battery of tests given to the subjects that phonological awareness and auditory sequential memory are good predictors of reading ability.

Auditory Perceptual Training on Young Children, Middle Aged Students, and Adults

Felton, Naylor, and Wood (1990) indicated that auditory deficits in the area of phonological skills can be seen at an early age. If early intervention does not occur

auditory deficits will continue into adulthood. Deitrich (1994) conducted a pretest/posttest experimental study on 30 college students on the effects of auditory perceptual training and reading ability using the following items: Peabody Picture Vocabulary Test- Revised, Degrees of Reading Power, Lindamood Auditory Conceptualization Test (LAC test), and Word Identification and Word Attack subtests of the Woodcock Johnson Achievement Test. Lindamood Auditory Conceptualization Test was used to get a basal score on auditory perception skills. The experimental group received training with the Auditory Discrimination in Depth Program (A.D.D. Program) for two hours a week for one semester. After auditory perceptual training, the experimental group performed significantly higher on receptive vocabulary, word attack, and word identification skills. A posttest score showed a significant increase in scores on the LAC test, word identification, and word attack tests. Deitrich's findings differed from what previous studies indicated about training adults in the area of auditory perceptual skills such as phonological skills. According to Deitrich (1994) several false assumptions were made pertaining to adult poor readers and auditory perceptual training. Some of these false assumptions were that adults already have the skills needed for reading decoding, that phonological abilities are not needed to acquire efficient reading skills, and that it was not possible for adults to develop or improve phonological skills to attack reading decoding. Deitrich asserted that the reason for these false assumptions is the minute amount of research on individuals beyond the middle school years in the areas of auditory perceptual skills. Thus, Deitrich's study revealed that it was possible to teach phonological skills through training in auditory perceptual skills to adults in the hopes of

improving their reading ability.

A study conducted by Truch (1994) also used the Auditory Discrimination in Depth Program (ADD). Truch presented data on 281 individuals ranging from school age to adulthood who participated in the ADD program. The 281 subjects were pretested and posttested using the Wide Range Achievement Test -Revised (WRAT-R), Woodcock Reading Mastery Test - Revised (WRMT-R), and The Lindamood Auditory Conceptualized Test (LAC). The ADD program was implemented four hours a day, five days a week for four consecutive weeks. The ADD program focused on segmenting and blending phonemes, recognizing where phoneme changes occur, and knowing when to add, subtract, substitute, shift, and/or repeat a phoneme in a spoken syllable. The results of this study, like those of the Deitrich's study, revealed that individuals from school aged to adulthood can be taught phonological awareness skills through training in auditory skills. The improvements were exemplified in the areas of decoding, word identification, spelling, and contextual reading.

Several studies showed that individuals who are poor adult readers share a similar type of weakness with poor elementary school readers (Read, 1988). Lefly and Pennington (1991) found that adults who are poor readers also showed weak phonological processing skills in the areas of spelling and word attack performance. Watson and Miller (1993) proposed that the level of auditory perceptual skills can be an indicator of an individual's phonological abilities. These auditory perceptual skills, in turn, have a greater effect on reading.

Phonetic reversals are not uncommon among young children. However, when

this reversal problem continues into the school years, it results in reading difficulties and learning problems (McGiven, Berka, Languis, and Chapman, 1991). Individuals with these problems may benefit from auditory perceptual skills training.

Bradley and Bryant (1991) conducted a pretest-posttest study which trained five- and six-year-old children in phonological awareness skills. The training session lasted two years, and then the children were retested. The results of the study showed that the children who had the training were 8-14 months ahead in reading and 10-23 months ahead in spelling compared to the control group. Rosner (1993) explained "that many individuals continue to develop even more precise auditory analysis skills during their adolescence and adult years, but the acquisition of auditory analysis skills are not the consequence of natural development. They are the product of education, of informal and formal experiences that expand their knowledge about a specific domain" (p.43).

Previous studies done in relation to perceptual skills and their relationship to reading decoding have been limited. Thus, further studies on auditory perceptual training are needed to support training in this area and its positive effects on strengthening reading decoding abilities. How students receive, discriminate, organize, and remember will affect their reading level (Gillet, 1993). Thus, training in auditory perception may be a key factor in strengthening reading skills.

A review of related literature indicated that although some studies have been done on the effects of auditory perceptual training on young children and adults, no such studies have been done on its effects on adolescents. Thus, the purpose of this study was to examine the effects of auditory perceptual training on the reading decoding level of

adolescents. More specifically the study addressed the following questions:

1. What is the present auditory perceptual skills of the subjects in the study before the training?
2. Does auditory perceptual training improve skills in auditory perception?
3. What is their present reading level?
4. Is there a difference in their reading level after auditory perceptual training?
5. Is there a relationship between auditory perceptual training and reading decoding?

Method

Design and Sample

The design of this study was a pretest-posttest experimental method. A convenient sampling was used for the selection of subjects. The number of subjects (ss) in this study were four. These subjects were being served for learning disabilities in a self-contained classroom in a small rural high school in the state of Virginia.

Instruments

Two different instruments were used in this study. The first instrument was the Test of Auditory Analysis Skills (TAAS) by Rosner (1993). TAAS is an oral test that examines the subjects ability to identify the sounds in spoken words and the temporal ordering of those sounds. The items in this test included asking the subjects to delete sounds from a word given by the tester, and completing a word when only part of the word is given. The test consisted of two practice items and 13 test items. Each item was scored by correct responses. When the testee missed two items consecutively a ceiling was reached. The total raw score was secured by adding the number of correct responses. The level of auditory perceptual skills is then calculated by using the derived score table provided by the developer. TAAS has not been standardized, therefore, no confirmed reliability or validity has been established.

The second instrument was the Woodcock Reading Mastery Tests - Revised (WRMT-R). Word attack and word identification subtests of the WRMT-R were administered on an individual basis. The word attack subtest measured the subjects'

phonics ability and structural analysis skills. In this subtest the subject was required to read a set of nonsense words in the English language. The word identification subtest requires the subject to read real words in print. Ceiling was reached on both subtests when the subject's answers to six consecutive items on the same plate were incorrect. The reliability of this test was established using a split-half procedure. Woodcock Reading Mastery Tests' validity was supported through content validity and concurrent validity.

Procedure

Permission was obtained from the Superintendent of this particular school district. Parental permission was also obtained for their childrens' participation in this study. Parents and subjects were both informed of their rights to stop the study at any time during the process. They were also assured that the study was voluntary. All data acquired from this study were kept confidential. No information identifying the subjects nor school was mentioned. Once permission was procured, the TAAS and the Woodcock Reading Mastery Test word attack and word identification subtests were individually administered by the researcher to obtaining the pretest score.

Training Exercise

After pretesting with WRMT-R and TAAS, the training sessions began. The training plates were designed by Rosner(1993). They can be located in Rosner's book Helping Children Overcome Learning Difficulties. The researcher implemented the training exercises five days a week for five weeks. Each session lasted about twenty minutes. The training sessions took place in a room with only a table and enough chairs

around the table for each subject and the trainer. Everyday the subjects sat in the same seat usually by choice. The sessions took place everyday at 12:10 directly after the subjects' lunch. The sessions were over everyday at 12:30. The subjects then returned to math class. They all had the same teacher.

The training plates had 6 levels, one being the easiest and six being the hardest. The training exercises are basically different variations of how the material is presented on the TAAS. The level at which the researcher started depended on the subject's score on the TAAS. In this study all subjects were started at level one on the first day.

After the five weeks of training exercises, the WRMT-R and TAAS were given to determine if any improvement in the students auditory perceptual skills and reading ability occurred due to the training exercises.

Data Analysis

A dependent sample t-test was used to compare the mean scores from the pretest and the posttest of auditory perceptual skills. The scores on the pretest and the posttest were also compared to examine the effect of auditory perceptual training on word attack skills, word identification, and basic reading skills.

Results

Four subjects participated in this study. Of the four subjects, three were male and one was female. The mean chronological age (CA) of the subjects was 15-11. All subjects were enrolled in 9.5 grade level. All subjects received special education programs in a self-contained setting after being identified as learning disabled. The data were analyzed using dependent sample t-tests.

Observations from training exercises

Level 1 took only one and a half sessions to complete. Level one consisted of two syllable words with activities such as clapping hands to show how many syllables in the word. For example, de-fend, the subject would clap his or her hands twice, once for each syllable . Level one also worked with embedded sounds in words.

Level 2 took the longest of all levels. Seven days were spent on level 2. Level 2 was set up exactly like level 1 but with words of three or more syllables. The subjects found this to be a little more challenging. Three of the students missed one day during this period due to various reasons. During this level the students in the beginning had problems with activity 5 of level 2. For example, Say vacation, Now say cation, what didn't we say "va".

Four days were spent on the next two levels 3 and 4. The students readily grasped the concept of embedded sounds and the deletion of the beginning phoneme or ending phoneme as the activities in level 3 and 4 called for. One student was absent for a week because of suspension from school due to his behavior. Though the overall attitude of the

students during the training exercises up to that point was excitement and a willingness to work and strive to do their best.

Attitudes changed a little when level 5 was presented. Level 5 continued for six days. The attitudes changed due to the increasing difficulty in level 5. In level 5 skills such as deleting part of a consonant blend in a word or if the deletion took place in the middle of the word was difficult for these individuals. For example, one exercise asked for the individual to say spider, then to say cider. The individual was then asked, "What sound is missing in cider that you heard in spider?" The missing sound was |p|. The students had trouble hearing the consonant blend sound if deleted from the middle of the word. The students performed well if the deletion occured in the beginning or ending position. Sometimes their response would be that there is no sound missing or they didn't hear the |p| sound in the word spider. Frustration was seen in the students during level 5. The students did finally conquer this task.

The last day of the training exercise level 6 was presented. Level 6 dealt with sound substitution. For example, "Say 'make', Now say it again, but instead of |m| say |t|." The students found great success in this exercise. Due to time, the group was only able to substitute phoneme sounds at the beginning or the end. Time ran out before the middle sounds substitution could be introduced.

Testing of hypotheses

Hypothesis 1: There is no significant difference in the mean scores on the Test of Auditory Analysis Skills(TAAS) before and after the auditory perceptual training. The data were analyzed using a dependent sample t-test. The t-value was found to be significant at .05 level ($t=-3.66$, $df=3$, $p<.05$), (see Table 1). There is a significant difference in the mean scores of auditory perceptual skills after the training.

Table 1

Comparison of Subjects TAAS Scores Before and After TAAS Training

Group	Number	Mean	SD	$S\bar{x}$	t
Pretest Score	4	5.25	4.35	2.18	-3.66 *
Posttest Score	4	12.25	.96	.48	

$p<.05$, $df=3$

Hypothesis 2: There is no significant difference between the mean scores on word attack skills before and after the auditory perceptual training.

The t-value was found to be -8.31. This exceeded the critical value of -3.18. Thus the null hypothesis was rejected at .05 level (see Table 2). There is a relationship between auditory perceptual training and word attack score.

Table 2

Comparison of Subjects Word Attack Scores Before and After Auditory Perceptual Skills Training

Group	Number	Mean	SD	$S_{\bar{x}}$	t
Pretest Score	4	16.50	5.07	2.53	-8.31*
Posttest Score	4	37.25	8.26	4.13	

$p<.05$, df=3

Hypothesis 3: There is no significant difference in the mean scores on word identification subtest before and after the auditory perceptual skills training.

The data were analyzed using a dependent sample t-test. The t-value was found to be not significant at .05 level ($t=2.56$, $df=3$, $p>.05$), (see Table 3). Auditory perceptual training did not have a significant effect on word idnetification skills.

Table 3

Comparison of Subjects Word Identification Scores Before and After Auditory Perceptual Skills Training

Group	Number	Mean	SD	$S\bar{x}$	t
Pretest Score	4	29.25	8.96	4.48	-2.56
Posttest Score	4	34.00	11.61	5.80	

Hypothesis 4: There is no difference between the mean scores on the basic reading skills cluster before and after the auditory perceptual training.

The calculated t-value of -5.14 was found to be significant. This exceeded the critical value of -3.18. Thus the null hypothesis was rejected at .05 level. There is a relationship between training and basic skills cluster score (t=-5.14, df=3, p<.05), (see Table 4).

Table 4

Comparison of Subjects Basic Skills Cluster Scores Before and After Auditory Perceptual Skills Training

Group	Number	Mean	SD	$S\bar{x}$	t
Pretest Score	4	25.50	6.86	3.43	-5.14*
Posttest Score	4	35.00	10.55	5.28	

p<.05, df=3

Discussion

The purpose of this study was to examine if auditory perceptual training had an effect on reading decoding ability. The study was conducted in a rural town in the state of Virginia. Four subjects with learning disabilities being served in a high school self-contained setting participated. The present levels of the individuals' auditory perceptual skills were found using the Test of Auditory Analysis Skills (TAAS). The subjects' present reading level was analyzed using the word attack and word identification subtests of the Woodcock Reading Mastery Test-Revised (WRMT-R). After the auditory perceptual training, auditory perceptual skills were significantly affected. All four subjects' scores significantly increased after auditory perceptual skills training. The auditory perceptual training exercises involved an extensive amount of listening for beginning, middle, and ending sounds. An important result of this study is that auditory perceptual skills can be improved through training. Gillet (1993) believed that before learning to read, language acquisition requires almost total auditory skills. Therefore, language acquisition is the building ground for reading development. So, if an individual does not have adequate auditory processing skills then their reading development is going to be affected. Knowing this then, as teachers, we need to strengthen individuals' auditory processing skills in turn improving their reading ability.

The subjects' scores on the word identification subtest did not show a significant improvement. This may be due to the limited time and the subjects' habit of using sight word recall to figure out the words presented in the subtest. However, word attack and basic reading skills cluster scores were found to be significantly affected after auditory

perceptual training. The training exercises emphasized listening to sounds while omitting and substituting sounds into words which strengthened phonics skills. These phonics skills learned during the auditory perceptual training exercises were found to enhance the decoding of unknown words as evidenced by the subjects' scores on the word attack and basic reading skills cluster. Knowing phonics skills ability is affected greatly by an individuals auditory perception which in turn impacts individual's reading decoding ability, this is supported by two similar studies Deitrich (1994) and Truch (1994). Deitrich conducted a similar study but with college students and different training exercises. Deitrich's findings on scores before and after training revealed a significant improvement on word attack skills. Data presented in another similar study on auditory perceptual training also supported these findings (Truch, 1994). Truch's study of 281 individuals revealed an increase in reading decoding ability due to the auditory perceptual training.

The uniqueness of the present study as well as those noted above lies in the population of the subjects. Not many studies have been conducted on the effects of auditory perceptual training on reading decoding ability of high school or adult learning disabled subjects. Teaching auditory perceptual skills only to elementary school aged children is no longer warranted as a result of this study. The results of this study emphasized that teaching auditory perceptual skills to middle and high school students can significantly affect or improve their reading decoding ability. The significance of this study adds to and supports other research conducted on the effects of auditory perceptual training on reading decoding.

Recommendation

1. A larger sample assigned to smaller groups with several trainers might increase the generalization of the study.

2. A single subject research design could be another alternative.

3. The use of two groups one being an experimental group and one being a controlled group.

Limitation of the Study

1. As the number of subjects in this study was extremely small, the significant difference found in several aspects of reading using dependent sample t-test may not be generalizable.

2. The duration of training exercises was five weeks, this short period of time may affect the ability of these results to be generalizable.

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Appendices

Appendix A

Letter to Superintendent

Jennifer Marshall
705 H Oak St. Apt. L
Farmville, VA 23901
(804) 392-5203

Dear Sir:

I am a graduate student at Longwood College in Farmville, VA. I am currently working on my Master's Thesis in the area of mild to moderate disabilities. This letter is sent to you to request permission to conduct an experimental study at the County High School. My research will focus on the Effects of Auditory Perceptual Training on Reading Decoding. The study will include four students with reading disabilities from the special education program at the high school to participate in this study which are reading disabled. The study will entail pretest-posttest with training sessions every day for thirty minutes over five weeks. I will also acquire permission from the parents of the students who are randomly selected to participate.

I would greatly appreciate it if you would sign this letter and return the signed letter by January 15, 1997. If you have any questions please feel free to call me at (804)392-5203. I will be glad to submit to you a copy of my methods sections to help clarify any question or concerns you might have about the research process. Thank you for your time. I look forward to hearing from you.

Sincerely,

Jennifer Marshall
Longwood College
Graduate Student

Yes, I give permission for this study to take place in the high school _____
No, I do not give permission for this study to take place in the high school_____

Appendix B

Parental Consent Form

Parental Consent Form

I, _____, consent to participate (or to allow my child to participate) in the research project entitled: The Effects of Auditory Perceptual Training on Reading Decoding.

I acknowledge that the purpose of this study, the procedures to be followed, and the expected duration of my participation have been explained to me. Possible benefits of this study have been described to me.

I acknowledge that I have had the opportunity to obtain additional information regarding this research project, and that any questions I have raised have been answered to my full satisfaction. I understand that my child's participation in this research is voluntary, and I am free to withdraw my consent at any time and to discontinue participation in this project without prejudice. Further, I understand that no information will be presented which will identify my child as the subject of this study unless, I give my permission in writing. I will also be informed of all findings in this study.

Finally, I acknowledge that I have read and fully understand this consent form. I sign it freely and voluntarily. A copy has been given to me.

Date: _____ Signed: _____
(Participant)

Date: _____ Signed: _____
(Parent)

Date: _____ Signed: _____
(Witness)

Appendix C

Test of Auditory Analysis Skills

The Test of Auditory Analysis Skills

Item	Question	Correct Response
A Say **cowboy**	Now say it again, but don't say **boy**	**cow**
B Say **steamboat**	Now say it again, but don't say **steam**	**boat**
1 Say **sunshine**	Now say it again, but don't say **shine**	**sun**
2 Say **picnic**	Now say it again, but don't say **pic**	**nic**
3 Say **cucumber**	Now say it again, but don't say **(q)**	**cumber**
4 Say **coat**	Now say it again, but don't say **/k/ (the k sound)**	**oat**
5 Say **meat**	Now say it again, but don't say **/m/ (the m sound)**	**eat**
6 Say **take**	Now say it again, but don't say /t/ **(the t sound)**	**ache**
7 Say **game**	Now say it again, but don't say **/m/**	**gay**
8 Say **wrote**	Now say it again, but don't say **/t/**	**row**
9 Say **please**	Now say it again, but don't say **/z/**	**plea**
10 Say **clap**	Now say it again, but don't say **/k/**	**lap**
11 Say **play**	Now say it again, but don't say **/p/**	**lay**
12 Say **stale**	Now say it again, but don't say **/t/**	**sale**
13 Say **smack**	Now say it again, but don't say **/m/**	**sack**

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Appendix D

Word Identification Subtest from Woodcock

Reading Mastery Test-Revised(WRMT-R)

WORD IDENTIFICATION

Basal ..... *the first 6 consecutive correct responses that begin with the first item on an easel page.*

Ceiling ..... *the last 6 consecutive failed responses that end with the last item on an easel page.*

	Score (1 or 0)		Error Response
1.	____	go	
2.	____	the	
3.	____	me	
4.	____	not	
5.	____	red	
6.	____	box	
7.	____	look	
8.	____	do	
9.	____	big	
10.	____	yes	
11.	____	this	
12.	____	bee	
13.	____	green	
14.	____	fly	
15.	____	hot	
16.	____	bus	
17.	____	ten	
18.	____	some	
19.	____	here	
20.	____	black	
21.	____	bear	
22.	____	old	
23.	____	house	
24.	____	eat	
25.	____	leg	
26.	____	away	
27.	____	time	
28.	____	new	
29.	____	people	
30.	____	sheep	
31.	____	everyone	
32.	____	date	
33.	____	warm	
34.	____	low	
35.	____	family	
36.	____	river	
37.	____	great	
38.	____	wonderful	
39.	____	should	
40.	____	money	
41.	____	lemon	
42.	____	without	
43.	____	exit	
44.	____	chew	
45.	____	question	
46.	____	piece	
47.	____	strange	
48.	____	brought	
49.	____	cattle	
50.	____	groan	
51.	____	dangerous	
52.	____	journey	
53.	____	major	
54.	____	garage	
55.	____	cruel	
56.	____	wreck	
57.	____	entrance	
58.	____	budget	
59.	____	pioneer	
60.	____	inquire	
61.	____	wealth	
62.	____	allowable	
63.	____	ache	
64.	____	vacant	
65.	____	quench	
66.	____	extinguish	
67.	____	prudent	
68.	____	circumstance	
69.	____	occasionally	
70.	____	flamboyant	
71.	____	epidemic	
72.	____	tranquility	
73.	____	sympathize	
74.	____	hindrance	
75.	____	zodiac	
76.	____	plausible	
77.	____	limousine	
78.	____	embassy	
79.	____	velocity	
80.	____	abdominal	
81.	____	alienate	
82.	____	proximity	
83.	____	amidships	
84.	____	baroness	
85.	____	vivacious	
86.	____	lethargic	
87.	____	transient	
88.	____	edifice	
89.	____	ptomaine	
90.	____	verbatim	
91.	____	itinerary	
92.	____	jujitsu	
93.	____	grandiose	
94.	____	amiable	
95.	____	xerography	
96.	____	narcissism	
97.	____	subsidiary	
98.	____	quixotic	
99.	____	obelisk	
100.	____	consanguinity	
101.	____	déclassé	
102.	____	psychical	
103.	____	zoophile	
104.	____	epigraphist	
105.	____	facetious	
106.	____	shillelagh	

Test 3 Raw Score ◯

Appendix E

Word Attack Subtest from Woodcock Reading

Mastery Test-Revised(WRMT-R)

WORD ATTACK

Basal . . . . *All subjects begin with Item 1.*
Ceiling . . . . . *the last 6 consecutive failed responses that end with the last item on an easel page.*

Sample A. ____ tat

Sample B. ____ op

	Score (1 or 0)		Error Response	Sound Category or Syllable (Error Inventory)
1.	____	ree . . . . . r-ē	____	16-34
2.	____	ip . . . . . i-p	____	30-15
3.	____	din . . . . . d-i-n	____	3-30-13
4.	____	ig . . . . . i-g	____	30-5
5.	____	dat . . . . . d-a-t	____	3-28-19
6.	____	tay . . . . . t-ā	____	19-33
7.	____	yee . . . . . y-ē	____	24-34
8.	____	rayed . . . . r-ā-d	____	16-33-3
9.	____	mem . . . . m-e-m	____	12-29-12
10.	____	oft . . . . . o-ft	____	31-26
11.	____	glack . . . . gl-a-k	____	26-28-9
12.	____	hend . . . . h-e-nd	____	6-29-26
13.	____	shum . . . . sh-u-m	____	18-32-12
14.	____	eb . . . . . e-b	____	29-1
15.	____	dreek . . . dr-ē-k	____	26-34-9
16.	____	weaf . . . . w-ē-f	____	22-34-4
17.	____	knap . . . . n-a-p	____	13-28-15
18.	____	ful's . . . . . f-u-lz	____	4-32-26
19.	____	sess . . . . s-e-s	____	17-29-17
20.	____	chur . . . . . ch-ər	____	2-41
21.	____	zoath . . . . z-ō-th	____	25-36-20
22.	____	rejune . . . rə/jo͞on	____	68/69
23.	____	depine . . . də/pīn	____	70/71
24.	____	viv . . . . . v-i-v	____	21-30-21
25.	____	yox . . . . . y-o-ks	____	24-31-23
26.	____	rhunk . . . r-u-ŋk	____	16-32-26
27.	____	throbe . . . thr-ō-b	____	27-36-1
28.	____	sloy . . . . . sl-oi	____	26-38
29.	____	sprawn't . . . . . spr-aw-nt	____	27-37-26
30.	____	quox . . . . kw-o-ks	____	10-31-23
31.	____	phet . . . . . f-e-t	____	4-29-19
32.	____	brecked . . br-e-kt	____	26-29-26
33.	____	wrault . . . r-aw-lt	____	16-37-26
34.	____	darlanker . . . . . dar/laŋ/kər	____	72/73/74
35.	____	whumb . . hw-u-m	____	7-32-12
36.	____	mieb . . . . m-ī-b	____	12-35-1
37.	____	squow . . . skw-ou	____	27-40
38.	____	pelnidlun . . . . . pel/nid/lun	____	75/76/77
39.	____	hopdalhup . . . . . hop/dal/hup	____	78/79/80
40.	____	untroikest . . . . . un/troik/est	____	81/82/83
41.	____	lunap . . . . lo͞o/nap	____	84/85
42.	____	cedge . . . s-e-j	____	17-29-8
43.	____	pnir . . . . . n-ər	____	13-41
44.	____	ceisminadolt . . . . . sēz/min/ə/dolt; sīz/min/ə/dolt	____	86/87/88/89
45.	____	byrcal . . . bər/kal	____	90/91

Test 4 Raw Score ◯