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ABSTRACT

The purpose of this study was to evaluate the effect of increased phonemic awareness instruction on the writing ability of At Risk first graders. Twenty-three students from a suburban first grade classroom in Central New Jersey were involved in the study. Twelve at risk students were divided into two groups, each of which received one half hour of daily supplemental reading instruction from the Basic Skills teacher which included phonemic awareness activities such as letter recognition, letter/sound correspondences, rhyme, segmentation, word families, and Elkonin boxes. The eleven control children received reading instruction solely from the classroom teacher who used a basal reading program. Scores from a pretest which was administered in May of kindergarten were compared to a post test which was given at the end of January of first grade and evaluated auditory discrimination, word awareness writing ability and writing samples. Both control and experimental samples made considerable growth in spelling and writing abilities from the end of kindergarten to January of first grade. The experimental sample demonstrated the greatest increases in the posttest results after increased phonemic awareness instruction, even though the control group had overall higher scores. Children who are low in phonemic awareness require explicit training in becoming aware of the internal structure of sounds in words which develops their ability to spell words phonetically. As the students become more aware of phonemes and their written form, they become more confident about their writing ability. (Author/RS)

The Effects of Phonemic Awareness Instruction on the Writing Ability of First Grade At Risk Students

by

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Abstract

The purpose of this study was to evaluate the effect of increased phonemic awareness instruction on the writing ability of At Risk first graders. Twenty three students from a suburban first grade classroom in Central New Jersey were involved in the study. Twelve At Risk students were divided into two groups, each of which received one half hour of daily supplemental reading instruction from the Basic Skills teacher which included phonemic awareness activities such as letter recognition, letter/sound correspondences, rhyme, segmentation, word families, and Elkonin boxes. The eleven control children received reading instruction solely from the classroom teacher who used a basal reading program. Scores from a pretest which was administered in May of kindergarten were compared to a post test which was given at the end of January of first grade and evaluated auditory discrimination, word awareness writing ability and writing samples. Both control and experimental samples made considerable growth in spelling and writing abilities from the end of kindergarten to January of first grade. The experimental sample demonstrated the greatest increases in the post test results after increased phonemic awareness instruction, even though the control group had overall higher scores. Children who are low in phonemic awareness require explicit training in becoming aware of the internal structure of sounds in words which develops their ability to spell words phonetically. As the students become more aware of phonemes and their written form, they become more confident about their writing ability.

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Children enter first grade with a various levels of understanding of the alphabetic principle and phonemic awareness which corresponds to their writing ability. Many At Risk first grade students are hesitant to write stories or responses to activities because they are unfamiliar with phonemes and the letter-sound connections that are necessary to produce words in written form. As part of the Basic Skills program, they receive supplementary instruction to develop their understanding and use of the alphabetic principle which should transfer to their reading and writing skills.

Research has shown that knowledge of the alphabetic principle is an important factor in the writing ability of young students. Children must acquire basic phonemic awareness and, in particular, the ability to detect systematic relationships between the sound segments of spoken words and the letters in their spelling (Adams, 1990). Once the first grade At Risk students acquired this knowledge, they were more willing to put their thoughts in written form since they were able to decode words. Therefore, the quality of their writing was enhanced. The increase of phonemic awareness training with first grade At Risk students definitely affected their writing ability and resulted in improvement as compared to another sample which received only reading and writing instruction from the classroom teacher.

According to Eldredge and Baird (1996), phonemic awareness, the conscious ability to segment spoken words into their constituent phonemes, is a prerequisite for the acquisition of the alphabetic principle and that, in turn, seems to be an important knowledge source for young writers. Their study supported other studies which suggested that spelling improvement is enhanced when children are provided with phonemic awareness and phonics training. Writing samples of children who were trained in phonemic awareness produced overall better compositions than children who were taught to write using the holistic approach.

In a study performed by Davidson and Jenkins (1994) it was discovered that children tend to acquire the particular generalizations that they are taught concerning phonemic processes but performed poorly on generalizations that had no instruction. Opportunities to practice various types of phonemic tasks such as segmentation and blending definitely developed spelling skills.

Griffith (1991) found that phonemic awareness has a powerful effect on the invented spellings of first grade writers. At this level, spelling is primarily an encoding process and relies heavily on phonological processing which can be acquired through training in the early school years. The ability to focus on a word's phonemic structure gets children started at inventing spellings.

Muter, Hume & Snowling (1997) performed a study with kindergarten and first grade students and concluded that letter name knowledge predicted spelling skills and had an effect on the students' segmentation skills. Segmentation was strongly correlated to spelling skills by the end of first grade.

According to Tangel and Blachman (1995) research suggests that phoneme awareness facilitates the development of invented spelling. During their study of first graders who were trained in a program that emphasized phoneme awareness and the alphabetic code, these students outperformed the assessments of control children who had no additional instruction in phonemes.

Clarke (1988) performed a year long writing study with first graders and found that when children were encouraged to use invented spelling, their writing was superior to children involved in a writing program that did not stress the use of invented spelling.

Hypothesis

To add to this body of research, the following study was undertaken. It was hypothesized that there would be no significant difference in the writing samples and

phonemic awareness ability of At Risk first grade students, one of which was performed as a pre-test at the end of kindergarten before any supplemental instruction had begun in first grade and another which was taken in late January in first grade as a post-test after there had been additional phonemic awareness training. Additionally, there would be no significant difference between the abilities on those measures of the two samples at the end of the instructional period.

Method

Subjects

Twenty-three students from a self-contained first grade classroom in a small suburban community in Central New Jersey were included in the study. The students came from diverse ethnic backgrounds and attended different kindergarten classes within the school and from other school districts. Their kindergarten experiences provided various exposure to phonemic awareness and writing activities.

The study compared the writing abilities of an experimental and control group within the same classroom. The control group consisted of six boys and five girls. Twelve At Risk students, seven boys and five girls, had been assigned to the experimental group which received Basic Skills instruction for a half-hour daily from a Basic Skills instructor. An additional At Risk student had been classified during the month of January and placed in a self contained Special Education classroom. The students were placed in the At Risk program as a result of teacher recommendation and/or their performance on the school system's Spring Kindergarten Assessment which determines reading/writing literacy. The assessment scored the child's abilities in eight areas: letter recognition, auditory discrimination, concepts about print, story retelling, writing samples, word awareness writing activity, sight word recognition, and oral

reading. The experimental sample's reading and writing ability was at a lower level than the control group's as determined by the assessment results.

Procedures

Both samples received reading instruction in a whole class setting from the classroom teacher who used the Harcourt Brace Grade 1 reading program. The experimental group received one-half hour of daily remedial reading instruction in a pull-out class situation from the Basic Skills teacher as a supplement to their classroom reading instruction. Five of these students met at one time period while the other seven children met during another half-hour. The control group was the remainder of the class who received reading instruction solely from the regular classroom teacher.

The experimental sample received instruction from the Basic Skills teacher who developed phonemic awareness through a variety of activities and lessons: letter recognition and letter/sound correspondences were promoted; nursery rhymes were used to develop rhyme and alliteration abilities; the ability to hear words within sentences was developed by clapping for each word; awareness of initial, middle, and ending sounds in words was increased by phonemic segmentation activities; word families were developed by the use of onset and rime. The use of Elkonin boxes assisted the students with the auditory discrimination and enabled them to listen for sounds and then write the corresponding letters in the boxes. Many of the language activities were put in written form on an experience chart to provide visual aid and reinforcement of activities. As the experimental group progressed with various writing activities to reinforce concepts, they had access to and relied upon individual alphabet charts which displayed the letter and corresponding pictures that began with the same letter sound during early writing activities.

This study compared the results of pretest and post-test phonemic awareness measures and writing abilities. Students in both the experimental and control groups were administered three tasks as a pretest before any phonemic awareness instruction had begun in the beginning of the first grade school year. Originally, it was planned to use the school district's First Grade Fall Assessment as a pretest measure. However, due to family emergencies and illness, the assessment was not administered to the children by the classroom teacher until early November and would have not been a true indicator of their phonemic awareness before related activities were used. Results of the Spring Kindergarten assessment which measures the same auditory discrimination and word awareness writing activities were used as the pretest instead.

Students in the experimental and control samples were given three tasks as a pretest before any phonemic awareness activities had begun in first grade:

1. Auditory discrimination results from the Spring Kindergarten Assessment.
2. Word awareness writing activity from the same assessment in which students spelled orally given words.
3. Writing samples which responded to a story that was read to the class and assessed using a holistic scoring scale.

In late January the experimental and control samples were given a post test which measured the same three pretest tasks. The auditory discrimination section compared the number of correct answers for 17 words. The word awareness writing activity was measured by a holistic scale that scored words assigning values from 0 for no response to 5 for correct response on the basis of precommunicative, semi-phonetic, phonetic, transitional, and correct spellings. Both writing samples for the experimental and control samples were evaluated and compared on the basis of the quality of the writing

sample: total number of words used, total number of words spelled phonetically, and total number of words spelled correctly.

Tests of mean difference between the samples' achievements were used to analyze the data.

Results

Auditory Discrimination

Table 1 presents the mean scores and standard deviations for the auditory discrimination results of seventeen words which were given to the individual students orally: man, jump, pig, goat, top, sun, fish, boat, hat, very, kitten, lunch, wolf, run, dog, nest, and zoo. The student was given credit for words in which he/she could identify the beginning sounds correctly. The pretest was administered in May of kindergarten, with the posttest sample using the same list of words given at the end of January in first grade.

Table 1
Auditory Discrimination Results of the Control and Experimental Samples

	Sample	M	SD	t
May of Kindergarten	Control (n=11)	17.0	.00	3.11
	Experimental (n=12)	10.75	6.97	
	Significant < .01			
End of January of First Grade	Control (n=11)	16.83	.39	
	Experimental (n=12)	16.83	.39	
	NS			

As reflected by results of the pretest which was taken in May of the kindergarten year, there was a significant difference between the control and experimental samples' auditory discrimination. After the experimental sample received additional phonemic awareness training during the months of September through January in first grade, the January result of first grade showed no statistical difference between the two samples. The experimental sample had shown a significant increase in their ability to discriminate the beginning auditory sounds for the seventeen words which were presented orally to them.

Word Awareness Writing Activity

The results of the Word Awareness Writing Activity are presented in Table 2. The students were orally given twelve words which they were asked to spell in written form. The spelling of the words was analyzed using a holistic scoring chart with the following scale: 0 for no response, 1 for pre communicative (random letters); 2 for semiphonetic (correct first letter, possibly followed by random string); 3 for phonetic (phonetically related letters); 4 for transitional (phonemes represented with a mix of phonetically related and conventional letters); and, 5 for correct spelling. Appendixes B and C list the findings for the Word Awareness Writing Activity.

Table 2
Word Awareness Writing Activity Total Scores of the Control and Experimental Samples

	Sample	M	SD	t
May of Kindergarten	Control (n=11)	30.25	12.65	2.36
	Experimental (n=12)	18.50	11.74	
	Significant < .05			
End of January of First Grade	Control (n=11)	38.08	14.00	0.89
	Experimental (n=12)	34.33	4.01	
	NS			

There was a significant difference in the Word Awareness Writing Activity total scores between the control and experimental samples at the end of kindergarten. The word awareness was remarkably different between the two samples. The control mean was 30.25 and the experimental mean was 18.50 which demonstrates that the latter group did not portray effective phonemic awareness abilities at that time.

However, there was no statistical difference between the total word awareness scores of the two samples at the end of January of first grade although there is a four point mean difference between the samples. Therefore the samples are similar at the end of January of first grade in the total word awareness scores.

Table 3
Mean Developmental Levels of Individual Words in Word Awareness Writing Activity for Control and Experimental Groups

Variable	Control Sample (n=11)		Experimental Sample(n=12)	
	May/Kdg	Jan./First Gr.	May/Kdg	Jan./First Gr.
bed	3.91	4.20	2.42	3.33
truck	2.55	3.55	1.50	2.67
letter	3.09	3.45	1.92	2.83
bumpy	3.00	3.27	1.58	2.58
dress	2.64	3.45	1.58	2.83
jail	2.09	3.36	1.42	3.00
feet	3.18	4.36	1.83	3.08
shopping	2.00	3.27	1.33	2.58
monster	3.00	3.36	1.50	2.83
raced	2.82	3.00	1.42	2.92
boat	2.82	3.09	1.75	3.00
hide	2.64	2.91	1.50	2.83
Total Mean Developmental Levels	2.81	3.44	1.65	2.87

Developmental levels were based on the holistic scoring scale ranging from 0 for no response to 5 for correct spelling. The mean developmental levels in Table 3 show increases ranging from .28 to 1.27 for the control group. Although the experimental sample demonstrated lower total mean developmental levels, their increases from May of kindergarten to January of first grade ranged from .91 to 1.58. Their increases were consistently higher for individual words than the control group. The total mean developments mean increases for the control group was .83 and the experimental group was 1.22.

Writing Samples

In May of kindergarten the students were read the story The Very Hungry Caterpillar by Eric Carle and were asked to respond in written form to the question, "What did the butterfly see as it flew around?" In January of first grade the students were read the story Swimmy by Leo Lionni and were asked to respond in written form, "What will Swimmy and his friends do next?" There was no discussion of either story before the students wrote their responses. They were simply asked to respond to the given questions. Tables 4, 5 and 6 present the respective results of total number of words written, total number of words spelled phonetically, and total number of words spelled correctly for the pretest and post test writing samples of the control and experimental groups.

Table 4
Total Number of Words in Writing Samples of Control and Experimental Groups

	Sample	M	SD	t
May of Kindergarten	Control (n=11)	6.00	3.81	2.53
	Experimental (n=12)	2.42	3.09	
	Significant < .05			

	Sample	M	SD	t
End of January of First Grade	Control (n=11)	16.83	10.69	0.46
	Experimental (n=12)	14.92	9.59	
	NS			

In May of kindergarten, there was a significant difference < .05 in the total number of words used in the writing samples between the control and experimental groups. The mean number of words written by both groups shows that the control group wrote more words. At the end of January of first grade, however, there was no significant difference in the total number of words used in the writing samples between the control and experimental groups. The samples were similar in the number of words used.

Table 5
Total Number of Words Spelled Phonetically in Writing Samples of Control and Experimental Groups

	Sample	M	SD	t
May of Kindergarten	Control	2.83	2.33	1.67
	Experimental	1.33	2.06	
	NS			
End of January of First Grade	Control	7.92	5.82	0.44
	Experimental	7.00	4.29	
	NS			

There was no statistical significant difference in the number of words spelled phonetically in the writing samples between the control and experimental groups in May of kindergarten. There also was no statistical significant difference in the number of words spelled phonetically in the writing samples between the two groups at the end of January of first grade. These findings suggest that at the onset, in terms of spelling phonetically, the control group could spell somewhat better than the experimental group. At the end of the experiment, the two samples maintained their two positions. They were both spelling words more regularly. There was no greater effect on eithe. sample. However, the total mean number of words increased for both groups, with the experimental group resulting in a slight lead.

Table 6
Mean of Total Number of Words Spelled Correctly in Writing Samples of Control and Experimental Groups

	Sample	M
May of Kindergarten	Control	3.36
	Experimental	1.00
End of January of First Grade	Control	9.73
	Experimental	4.42

There was a definite increase in the mean of the total number of correctly spelled words in the pre and post test writing samples of the two groups. The control group demonstrated a larger increase of 6.37 for the mean of the number of correctly spelled words. The experimental group's increase was not as great, with an increase mean of 3.42 words spelled correctly.

Conclusion

For the purposes of this study, it was hypothesized that there would be no significant differences in the phonemic awareness and writing sample abilities of At Risk first grade students between samples taken in May of kindergarten (rejected) and then at the end of January of first grade after additional phonemic awareness instruction had been given to this group of children (accepted). It was also hypothesized that there would be no significant difference between the At Risk, or experimental sample, and control samples' abilities at the end of the instructional period, which was only partially rejected.

Understanding the alphabetic principle and phonemic awareness are necessary foundations for early learners' writing abilities. As demonstrated by the results of this study, many of the experimental sample first grade students were deficient in auditory discrimination, word awareness writing ability, and spelling in writing samples according to an end of kindergarten assessment.

Research has shown that children who are low in phonemic awareness require explicit training in hearing the individual sounds in words. The additional daily Basic Skills instruction that the experimental group received incorporated phonemic awareness activities through a variety of mediums. This phonemic awareness training heightened the students' sensitivity to the internal structure of words which in turn benefited their spelling patterns as they matched sounds to letters in their invented spelling.

The training in phonemic awareness enhanced the quality of the experimental group's post test writing samples. Since the children were trained to spell by sound, they wrote better in the post test because they had the freedom to spell without the standard form and gained independence and confidence as they used invented spelling to increase the amount of words and different types of words that they wrote.

The result showed that students who were low in phonemic awareness achieved at significantly lower levels than the high phonemic awareness students at the end of kindergarten in the areas of auditory discrimination, word awareness writing activity, and writing samples. However, the experimental sample made greater gains than the control group in these areas according to the post test assessment at the end of January of first grade, after they had received additional phonemic awareness training.

The low phonemic awareness groups may not have equaled the high phonemic awareness group in the final scores of their assessment, but their rate of increase surpassed the control group in the three areas assessed: auditory discrimination, word awareness writing activity, and writing samples. According to research, and as demonstrated by this study, the low achievers accounted for most of the gain with their invented spelling, even though their final scores remained lower than the control group's.

According to the pre test assessments results taken in May of kindergarten, there were significant differences between the experimental and control samples in auditory discrimination, word awareness writing activity, and writing samples. However, according to the post test results of the same three areas taken at the end of January in first grade, after the At Risk students received daily additional phonemic awareness activities, there was no statistical difference between the two samples' abilities. The auditory discrimination mean for both groups was 16.83, from a possible 17 correct. The total mean scores for the word awareness writing activity for the control group was 38.08, and the experimental group was 34.33. Even though there was a four point difference, there was no statistical difference between the two groups. The writing samples also displayed no statistical diffference tetween the two groups at the end of January of first grade. The total word mean for the control group was 16.83 and the

experimental group was 14.92. The number of words spelled phonetically for the control group was 7.92 and the experimental group was 7.00.

Although there may have been significant differences between the two samples abilities at the end of kindergarten, there were no statistical significant differences between their abilities after the experimental group's phonemic awareness instruction period. Therefore, it is concluded that explicit phonemic awareness instruction definitely enhances the spelling and writing abilities of At Risk first grade students.

The Effect of Phonemic Awareness Instruction on the

Writing Ability of First Grade At Risk Students:

Related Research

Piaget (1972) has said, "Children should be able to do their own experimenting.... In order for a child to understand something, he must construct it himself, he must reinvent it. Every time we teach a child something, we keep him from inventing it himself" (Adams, 1985, p. 385). The concept of children developing written material from their ideas is an appropriate example of Piaget's statement. In order for children to understand what they have written, they must construct the sounds and words that they hear into print which becomes an easier task when their phonemic awareness abilities have been developed. Researchers have become particularly interested in the development of early invented spellings as young children attempt to put their thoughts in written form (Tangel & Blachman, 1992).

According to Lundberg (1978) as cited in Lundberg, Frost & Peterson (1988, p.265), "Practically all children learn to understand and use spoken language during the first years of life. Although young children speak in words, syllables, and phonemes, they do not seem to have much conscious control over these units of language." Adams (!990) expressed the thought that it may be difficult for some children to grasp the idea that words are composed of smaller units, or phonemes, since they carry no meaning, and children are accustomed to thinking of words in terms of their meanings, not in terms of their linguistic characteristics. There also is the problem of producing a phoneme in isolation since phonemes are not discrete units and often overlap into those that come before it and follow it in a word (Griffith & Olson, 1992). Since alphabets represent spoken language in terms of phoneme-sized units (i.e., consonants and vowels), sequences of letters follow the sequences of phonemes. Therefore, understanding the alphabetic code requires children to realize that spoken language consist of sequences of phonemes (Mann, Tobin, & Wilson, 1987).

According to Griffith, Klesius & Kromrey (1992), phonemic awareness is the metalinguistic ability which allows children to reflect on features and structure of spoken language, including some ability to manipulate phonemes. Mann et al. (1987) found research has shown that phonological awareness is related to the ability to read an alphabet. One of the first results of this research was the finding that awareness of phonemes does not develop as rapidly or as automatically as language processing skills do. Many kindergarten-aged children who seem to be able to process normal language abilities are unable to count the number of phonemes in spoken words (Mann et al.). Lundberg et al. (1988) taught pre-school children to attend to the phonological structure of language prior to any explicit instruction about the alphabetic writing system (Griffith & Olson, 1991).

According to Byrne & Fielding-Barnsley (1989), as cited in Eldredge & Baird, (1996), phonemic awareness and letter-sound knowledge were needed for the acquisition of the alphabetic principle. They discovered from their research that the major hurdle for young learners in understanding the basic principle of alphabetic writing was the realization that speech is composed of small interchangeable units, or phonemes. Explicit instruction in letter-phoneme relations, combined with phoneme awareness , assisted the child in comprehending the function of those letters. Experimental studies (Bradley & Bryant, 1983; Lundberg, et al. 1988) have indicated that rather than being a developmental phenomenon, phonemic awareness can be acquired through early training (Griffith, 1991). According to the results of a study for implications for instruction, Griffith (1991) found that there is a need for early development of phonemic awareness with kindergarten and first-grade students. Ball & Blachman (1991) also found that some aspects of phoneme awareness can be taught to young children. Lundberg et al. concluded in a study by Oloffson & Lundberg (1983) that it is possible to increase

phonological awareness among preschool children by a relatively short training period of 6-8 weeks.

In a study performed by Bradley & Bryant (1983), as cited in Griffith, Klesius, & Kromrey(1992), it was concluded that reading and spelling progress was affected by phonemic awareness training and the training was more effective when it involved an explicit connection with the alphabet. Young learners must realize that words can be broken into syllables and phonemes and that phonemes can be represented by letters. Beginning readers and spellers must make use of the alphabetic code. "To a person who has well-developed phoneme awareness, an alphabetic system appears to be a reasonable way to represent our language. To those with little or no phoneme awareness, the system probably appears arbitrary" (Ball & Blachman, 1991, p. 51). According to Juel, Griffith, & Gough (1986), as cited in Griffith (1991, p. 216), phonemic awareness is a powerful, but indirect, factor in the growth of spelling ability in the first two years of schooling. Muter, Hulme & Snowling (1997) found that stage theories, such as those of Frith (1985) saw letter knowledge as necessary for the acquisition of alphabetic reading and spelling strategies. These strategies are only available to a child who has mastered the "alphabetic principle, i.e., the knowledge that particular phonemes in words are represented systematically by particular letters". Research has suggested that it is a critical step for children to be able to link phoneme awareness to the knowledge of letters (Adams, 1990).

Several studies in the field of phonemic awareness training by Ball & Blachman (1991), Hohn & Ehri (1983), Marsh & Mineo (1977), Williams (1980), and Yopp & Troyer (1992) have found that children can be successfully trained in activities which will result in significant increases in phonemic awareness. Reading experts are increasingly advising classroom teachers to provide linguistic stimulation beyond

speaking and listening skills with activities such as storytelling, word games, rhymes, and riddles to facilitate phonemic awareness. Studies such as that by Lundberg et al. (1988) reveal that less formal activities conducted in real classroom settings also result in gains in phonemic awareness and subsequent reading and spelling achievement (Yopp, 1992). However, "if the goal is to instill a generalized awareness of and ability to manipulate phonemes, then early literacy curricula should provide children with an opportunity to practice a variety of phonemic tasks. Instruction in only one kind of phonemic manipulation does not appear to result in generalized awareness" (Davidson & Jenkins, 1994, p. 156).

Adams (1990) describes five levels of phonemic awareness development in terms of abilities: (1) hear rhyme and alliteration in literature such as nursery rhymes that play with sounds in language; (2) do oddity tasks which compare and contrast the sounds of words for rhyme and alliteration; (3) blend and split syllables; (4) perform phonemic segmentation which counts the number of phonemes in a word; and (5) perform phoneme manipulation tasks such as adding or deleting a particular phoneme in a word.

Griffith (1991) found that literature that plays with language through the use of rhyme and alliteration helps children to focus their attention on words at the level of the phoneme. This may be accomplished by reading nursery rhymes or listening for the rhyme patterns in poems and games. According to Bradley & Bryant's study (1978), as cited in Muter, Hume, & Snowling (1997), young children's sensitivity to rhyme detection is enhanced by having the children pick out the non-rhyming word from a group of words where the remaining ones rhyme. Bradley & Bryant (1983) also state that rhyme detection can be performed by four and five year old children and is predictive of their later success with reading and spelling skills (Muter et al.1997). According to Goswami & Bryant (1990) as cited in Muter et al. p. 390, "There are

different levels of analysis for spoken words and awareness of these develops at different rates. They stress the importance of the syllable and two subsyllabic units; the onset and the rime. The rime comprises the vowel and succeeding consonants, if any; the onset refers to the consonant or consonant cluster that precedes the vowel." Goswami & Bryant (1990) also found that rhyming skills promote the awareness of the onset-rime which in turn influences children's development in spelling.

According to Adams (1990), phonemic awareness tasks at the third level, blending and syllable-splitting, require the child to be familiar with the ability to subdivide words into the small, meaningless sounds, or phonemes, and then be able to produce those sounds in isolation.

The blending and syllable-splitting task leads to phonemic segmentation which requires subjects to pronounce in isolation each individual phoneme of a spoken word (i.e., hear "sat"; respond "/s/,/a/,/t/). Since the ability to decompose spoken language into subsyllables is an important factor in learning to decipher words, early literacy training should give priority to phonemic segmentation. (Davidson & Jenkins, 1994). "Linguists (Chomsky, 1971,1979; Liberman, Shankweiler, Liverman, Fowler & Fischer, 1977; Read, 1971) suggest that the ability to hear sound segments within words and to represent them with letters is developmental, and that children's invented spellings can provide insight into their awareness of the phonological structure of words" (Uhry & Shephard, 1993, p. 219).

However, according to Lundberg et al. (1988), segmentation ability does not develop spontaneously. Morais, Bertelson, Cary & Alegria (1986) demonstrated the crucial role of an alphabetic script as the basis for developing segmentation skill. Muter et al.(1997) found that segmentation abilities promote the awareness of phonemes within

words which then facilitates the children's ability to assign letters to represent sounds when inventing spelling.

Some children have difficulty, however, in understanding the relations between speech sounds and written symbols as shown by the spectrographic analysis of the speech stream performed by Liberman, Cooper, Shankweiler & Studdert-Kennedy (1967). It is often impossible for some individuals to separate the phonemes of words without intervention and that this skill may be the most problematic for children who are later labeled as learning disabled (Ball & Blachman, 1991)."Two decades of research suggests that some skill in phonemic analysis is (1) directly related to the issue of understanding the pronunciation clues of whole language; and, (2) related to efficient decoding; and, (3) one of the key features of becoming conventionally literate", according to Sulzby & Teale, 1991, p. 746, as cited in Eldredge & Baird (1996).

Ehri & Wilce's study (1987), as cited in Griffith(1991), found that children's phonemic segmentation skills improved when they were taught to generate the phonetic spellings of words. Ball & Blachman (1991) concluded from an intervention study with kindergarten students that young children can be taught to segment spoken words into phonemes. Furthermore, their research suggests that the most pedagogically useful phonemic awareness training includes letter-name and letter-sound instruction primarily because it makes explicit the relationship between sound segments and letters (Griffith & Olson, 1992). Their data suggests that children trained in letter-name and letter-sound correspondences were more successful than control groups who did not receive the training with matching written symbols to sound segments of words (Ball & Blachman, 1991). Muter et al. (1997) also agreed with earlier studies by Adams (1990) that segmentation and letter knowledge separately and specifically predicted early spelling success.

One specific way to develop word recognition and spelling instruction is by the use of sound and word boxes. In an early training study, Elkonin (1973) developed a technique to teach children to isolate and identify individual sounds in words in an attempt to successfully prove that some aspects of phoneme awareness can be taught to young children. Children were taught to say a word slowly and then move a token into a box as each sound in the word was pronounced. Elkonin reported that five and six year old children taught with his method mastered sound analysis quickly, and that this training resulted in improvements in other areas of literacy (Ball & Blachman, 1991).

Word boxes are Clay's (1993) extension of Elkonin's (1963) sound boxes, both of which help children focus on the phonological and orthographic features of words (Joseph, 1998). Word boxes involve writing letters in boxes and can be related to breaking a word apart and representing the sounds with letters (Griffith & Olson, 1992). They have been used successfully with first-grade children as part of an extensive Reading Recovery program and "according to Clay, word boxes are used particularly with children who have difficulty hearing the order of sounds in words" (Joseph, 1998, p. 348). Ehri & Wilce (1987) used the technique of sound and word boxes with preschool pre-readers and found that the trained subjects learned more efficiently and were better at segmenting and spelling after training than control groups that received only letter-sound instruction (Uhrey & Shepherd, 1993). Tangel & Blachman (1995) performed a study with lower income, inner-city kindergarten children who were trained in phonemic awareness by using disks to represent the sounds of one, two and three phoneme words and the letter names and sounds for eight letters (a,m,t,i,s,r,f,b). This group of children was able to produce invented spellings which were superior in terms of the number of phonemes represented and the correct sequencing of phonemes as compared to control groups that did not receive the sound and word box training.

According to Stanovich & West (1989), students with reading difficulties not only demonstrate limited phonological skills but also have difficulty grasping orthographic (letter) knowledge about words. In a recent study performed by Joseph (1998) the word boxes helped students hear the orthographic features of words and process the visual order of letters in words. Many studies have shown that children make progress when phonological awareness training is combined in a meaningful way with the process of learning to relate the sounds of words to their spelling patterns. Hatcher (1994), as cited in Muter et al. (1997), refers to this as "phonological linkage".

Research indicates that children's awareness of phonemes can be hastened through appropriate training which should produce significant acceleration in their acquisition of reading and writing skills (Adams, 1990). According to Liberman, 1971; Liberman & Shankweiler, 1985; Rozin & Gleitman, 1977, as cited in Ball & Blachman (1991), developing an understanding of the link between the sounds of speech (phonemes) and the signs of print (letters) is the basic task facing the beginning reader and writer.

Griffith (1991) states, "Research suggests three possible ways phonemic awareness affects spelling development. First, it enables beginners to segment a word into its constituent phonemes as they invent spelling. Additionally, it facilitates the acquisition of letter-sound representations that can later be used to generate spellings. Finally, during reading, it aids in the storage of spelling for equivocal phonemes in specific words" (p.218). When children learn to spell words they must demonstrate an understanding of how spoken language relates to written language. (Griffith & Olson, 1992). The earliest spellings often demonstrated some phonemes of the word of interest, and not always correctly (Adams, 1985). The beginnings of invented spellings indicate that children have begun to develop an awareness of sounds, or phonemic segments.

(Tangel & Blachman, 1995). Muter, Hulme & Snowling (1997) found that invented spelling offers a window into the development of phonlogical awareness. Read (1971) and Chomsky (1971) stated, "The ability to invent preconventional spellings has been taken as the reflection of children's awareness of phonological structure", as cited in Mann, Tobin & Wilson (1987, p. 373).

Invented spellings refers to beginners' spelling of words using symbols that they associate with the sounds that they hear in words that they want to write (Clarke, 1988). .The studies of invented spellers (e.g., Beers, 1980; Chomsky, 1979; Morris, 1983) indicate an understanding of the alphabetic principle is also crucial for spelling development. These researchers identified many of the behaviors noted by Read (1971) in the writing samples of first grade children that they studied and also described the stages that children went through as they progressed from beginning spelling strategies (letter-naming) to correct (standard) spelling (Tangel & Blachman, 1992). When producing invented spellings, children assign letters to represent sounds in words. In the early stages of spelling development, consonants appear more often in children's invented spellings (Griffith ,1991)

"Our ability to understand these invented spellings was made possible by the work of linguist Charles Read" (Tangel & Blachman, 1992, p. 233). In 1971 Read conducted the first systematic study of invented spelling with a group of Boston preschoolers and concluded that the children's early attempts of spelling were influenced by their awareness of speech sounds. Read's conclusion was that children vary at levels of language development and perceive certain sounds differently (Tangel & Blachman, 1995). Mann et al. (1987) found that studies by Read and Chomsky have demonstrated how invented spelling responses can be used to study the phonological awareness of children in preschool years. Since children are at various levels of phonemic awareness,

not all children seem to invent spellings as readily as others. Research has found that the same speech-processing skills that allow children to process spoken sentences and keep them in working memory might also enable the child to invent phonologically accurate spellings Other research reveals that the status of certain linguistic skills may influence invented spelling ability.

Eldredge and Baird (1996, p. 197) performed a study and found that, "Because there is an imperfect phoneme/grapheme relationship in the English language, children's spelling was often inaccurate. However, children tried to write anything they could say, and spelling did not appear to become a distraction to the composing process". Chomsky (1979) and Gaves (1978) suggest that in using invented spelling, children are unrestricted by the few words they know how to spell or by the words supplied by the teacher. They will write any word they need, not just words they know or can find how to spell (Clarke, 1988).

" The most important associates of invented spelling ability are the ability to analyze words into their constituent phonemes and an awareness of grapheme-phoneme correspondences. Factors such as vocabulary size and IQ do not appear particularly relevant to whether or not a child is able to invent phonologically accurate spelling" (Mann et al., 1987, p. 375). It has been found that children in the early elementary grades use grapheme-phoneme correspondences (Water, Bruck, & Seidenberg, 1985). For this reason, correct spellings seem likely to reflect phonological awareness and some additional exposure to grapheme-phoneme correspondence rules (Mann et al.). Phonemic awareness has a more powerful effect on first graders which indicates that they rely heavily on phonological processing First graders also rely on the invented spelling strategy because they are generally poor at remembering correct spellings for words (Griffith, 1991)

When children use invented spellings, their level of phoneme/grapheme development allows one to "read" what has been written with a sense of understanding. However, in order to provide a quantitative description of spelling development, researchers Beers (1974) and Gentry (1977) developed one of the earliest scales to rate spelling development. Liberman (1985) and Mann (1987) also attempted to create a further scale which would study emerging literacy. It was based on two main features; the number of phonemes that the child represented and the level of orthographic representation (Tangel & Blachman, 1992).

Kindergarten and first grade children tend to hear and spell the sounds as they are spoken (Adams, 1990). During first grade children are exposed to approximately 90 different individual sounds. Direct instruction on individual letter-sound correspondences will help children to both decode and spell words" (Griffith et al. 1992). According to Mann et al. (1987) early invented spellings may not be conventional, but they follow logical linguistic patterns and become more accurate over time. Some ability to focus on a word's phonemic structure gets children started inventing spellings. Then, as they write, their skill at focusing on phonemes in words increases. Phonemic awareness and spelling interact such that each enhance's the other's development (Griffith, 1991).

Read (1971) and Chomsky (1971, 1979) found certain regularities in the spelling of pre-literate four-to-six year-old children who used invented spellings. The spellings differed from child to child but commonalities were found:

1) letters may be used according to the sound of their name (i.e., "ppl" for "people"), and is especially likely in the case of long vowels which are represented by the letter name that matches the sound (i.e., "bot" for "boat");

2) short vowels, because they have no letter name equivalent, are typically represented by the letter with the phonetically closest sound ("bad" for "bed", "fes" for "fish"), as are consonants that tend to be spelled with a digraph ("fes" for "fish");
3) "L" and "R" function as syllables with no vowel ("grl" for "girl". "klr" for "color") and "N" and "M" are omitted before consonants ("agre" for "angry"). (Mann, Tobin & Wilson, 1988), p. 368.

Clarke (1988) also found that:

4) letter names are used as syllables ("mitn" for "mitten");

5) nasals are omitted before final stop consonants "ad" for "and", "wet" for "went");

6) consonant letters are sometimes used for letter name sounds ("ys" for "was", "r" for "are");

7) the initial /dr/ sound is sometimes spelled as "jr" and /tr/ as "ch" ("jrs" for "dress");
(8) the medial /t/ sound in "letter" is often spelled "ladr").

"Read and Chomsky noted that each of these regularities capture the sound pattern of words in a "preconventional", yet phonetically-accurate manner. They thus interpret the regularities in the children's inventions as the reflection of an ability to access the phonological structure of words" (Mann, Tobin, & Wilson, 1988, p. 368).

While writing, young children directly confront the problem of representing spoken language with written language and develop the ability to segment phonemes in order to present logical written material (Griffith, 1991). According to studies by Chomsky, 1970; Gough, Juel & Griffith, 1992; Gough, Juel & Roper-Schneider, 1983; & Read, 1971, 1986, findings suggest that phonemic awareness training contributes to spelling development by allowing children to use phoneme-grapheme correspondence rules. The ability to link sounds and letters is related to phonetic spelling which is also related to "invented spelling" where children's writing may be incorrect orthographically

but yet have good phonemic structure. (Castle, Riach, & Nicholson, 1994). According to a study by Ball & Blachman (1991), groups that received segmentation training plus letter-name and letter-sound instruction spelled significantly better than groups which received only training in letter names and sounds or no intervention at all.

Many studies have been conducted by researchers to determine the effects of instruction of phonemic awareness on the writing and invented spelling patterns of young children, ranging from pre-readers through first and second grade. "In his original study in 1971, Read reported on the invented spelling he observed in a group of 20 Boston preschool children. In Read's analysis, children's knowledge of English phonology (the sound system of English) was related to their ability to deduce the alphabetic principle" Tangel & Blachman, 1992, p. 233).

Bradley & Bryant conducted a two-year study in England in 1985 which gave further evidence of the importance of making the connection between sound segments and written symbols. Pre-readers at risk for reading failure because of poor phonological skills were assigned to one of four groups; instruction in categorizing sounds by rhyme or alliteration; categorize sounds and also represent them with letters; semantic categorization; and, no instruction (Ball & Blachman, 1991). Bradley and Bryant found that combining sound categorization with letter training was the most effective method; children with sound and letter training were significantly better than controls in reading and spelling (Uhry & Shephard, 1993).

In 1987, Mann, Tobin & Wilson conducted two experiments with 22 kindergarteners which explored invented spelling as a predictor of reading skill and as a measure of phonological awareness. An invented spelling test used words chosen from the work of Read (1971) and Chomsky (1979) having properties such as a letter name within the word (e.g. "d" in "lady"),a short vowel, a nasal, a consonant represented with a

digraph (e.g. "fish" and "angry"). A four point system evaluated the invented spellings, ranging from 1/2 point for a single letter response to three points for phonetic structure in an preconventional manner and four points for conventionally correct spelling. On the invented spelling test, the mean values and standard deviations for the phonological accuracy score were 44.9 (4.8). On the average, children failed to respond to a test item less than 1% of the time, and fewer than 1% for their responses merited 1/2 or 1 point, where 10% of responses received 2 points, 55% received 3 points, and 34% received 4 points. The relation between performance on the phoneme classification test and invented spelling ability confirms the finding by Liberman and her colleagues (1985) that phoneme segmentation ability correlates with the phonological accuracy of invented spelling (Mann, Tobin & Wilson, 1987)

A study was performed by Clarke (1988) to compare writings of first grade children encouraged to use invented spelling with those who were encouraged to use traditional spelling in their creative writing. Four first grade classrooms which involved 102 children from the Ontario, Canada area, participated in the study, with two classes being encouraged to use invented spelling and two using traditional spelling. Children's writing samples were analyzed once a month from November to March on the basis of total number of words, number of T-Units (independent clauses), complexity of writing, words usage and spelling strategies. On the basis of pretests administered at the beginning of the year, Clarke selected a matched set of high-readiness students - twelve from the invented spelling classes and twelve from the traditional spelling classes - and another matched set - twelve and twelve - of low-readiness students. The readiness level was based on three pretests - ability to print lower case alphabet letters, spell words, and recognize words. For the two groups of high-readiness students, she found no significant differences on any of the post-tests. The low-readiness children who had been in the

invented spelling classrooms significantly outperformed their traditionally instructed peers on the majority of spelling and word recognition posttests (Adams, 1985) The low-readiness invented spellers demonstrated a better developed sense of phonemic and phonetic relations between spoken and written words.

When children were encouraged to use invented spelling in Clarke's (1988) year-long writing study, their writing was superior to children involved in the traditional form of writing that did not use invented spelling. "When the first writing samples were analyzed in early November, not only were all 48 children who were using invented spelling able to write on their own, but 85 % wrote at least one T-unit and several children wrote as many as four and five T-units." Clarke, 1988, p. 291). Results from t-tests indicated that low initial achievers accounted for most of the gain in spelling and reading that resulted from using invented spelling. The writing samples from children using invented spelling were longer, contained greater variety of words, and had a significantly smaller percentage of spellings at the "correct stage" - their mean of 58.4 compared to 94.0 of traditional group.. Their mean score was 40.9 for total words, compared to 9.82 for the traditional group. However, the mean of their percent of words at the phonetic stage was 28.3 compared to 3.1 for the traditional group (Clarke, 1988).

The superior spelling and phonic analysis skill of the group of students using invented spelling suggested that they benefited from the practice of matching sound segments of words to letters as they wrote and from using their own sound sequencing. "Clarke (1988) strongly believed that first grade children who wrote words by sounds wrote better because they had the freedom to spell without worrying about standard forms" (Eldredge & Baird, 1996, p 205). Children who used invented spelling were found to spend significantly more time rereading what they had written than children did

who were spelling traditionally. The results of Clarke's study suggest that the main benefits of invented spelling are for initially low achieving children (Clarke, 1988)

Tangel & Blachman performed two studies to determine if children trained in phoneme awareness differed in their invented spelling from children who did not receive this training. The first study was performed in 1992 and included 77 treatment and 72 control children from all day kindergartens in comparable low income, inner city schools. During the spring of kindergarten the treatment children received eleven weeks of phonemic awareness training in letter names and sounds.

The treatment group also exhibited a significantly higher level of spelling sophistication than the control group according to independent t-tests. The mean of the treatment group with phoneme segmentation increased from 12.2 to 23.4 on pre and post tests respectively, while the control group showed a slight increase from 11.7 to 13.1. "The top group of invented spellers contained 51% of the treatment children and only 17% of the control children. On the other hand, the bottom group of invented spellers contained 44% of the control children, and only 21% of the treatment children" (Tangel & Blachman, 1992, p. 247).

According to the findings of Tangel and Blachman, children who participated in the phoneme awareness intervention outperformed the control children on measures of phoneme segmentation, letter name and letter sound knowledge. In order to spell, a child must be able to break words into phonemic segments and then select the alphabetic symbol that corresponds to that segment of sound. After receiving phonemic awareness training, the treatment children demonstrated a greater skill in this area as evidenced by their more sophisticated invented spellings. The treatment children presented invented spellings that were more sophisticated in terms of number of phonemes represented, sequencing of phonemes and orthographic features. Tangel and Blachman's research

suggests that "instruction in phoneme awareness may be enhanced when the connections between the sound segments in words and the corresponding printed symbols are made explicit during training" (Blachman, 1989, 1991), as cited in Tangel & Blachman (1992, p. 255).

In 1995, Tangel and Blachman performed a follow-up study to the one done in 1992 in order to investigate the invented spelling of the same children at the end of first grade. During first grade, the treatment children continued to be trained in phonemic awareness and the alphabetic code as part of their reading program. The results of the study showed that the treatment children remained significantly ahead of control children at the end of first grade in terms of both invented and standard spelling. Using a developmental spelling scale, the mean for the treatment group of 4.56 indicates that as a group, treatment children were able to represent every phoneme with a mix of phonetically related and conventional letters. The control group mean of 3.52 indicates that they were able to represent more than one phoneme, but not all. Tangle and Blachman reported that the children who had participated in the phoneme awareness intervention were able to create invented spelling that were rated developmentally superior to those of the control children because they correctly represented more phonemes, including blends, long and short vowel sounds, and more orthographic patterns, including the -ed ending. (Tangel & Blachman, 1992)

In 1992, Griffith, Klesius, and Kromrey examined the decoding and spelling skills and writing fluency of first grade children with various levels of phonemic awareness. Two first grade classrooms from rural Florida were studied - one used the whole language approach and the other a traditional instruction with skills emphasis. Pretesting in September and posttesting in May compared spelling. writing samples and decoding.

The writing fluency was determined by total number of words and number of unique words used in the writing samples.

According to this study, beginning-of-the-year level of phonemic awareness was more important than method of instruction in first graders' literacy acquisition. Children who were high in phonemic awareness did well. Low phonemic awareness children in both types of classrooms made gains in phonemic awareness and approached the beginning - of-the-year levels of the high phonemic awareness children. This study supports the recommendation of researchers such as Juel (1988), and Lundberg et al. (1988) to provide children low in phonemic awareness with explicit training in hearing the individual sounds in words. Data from this study also suggests that high phonemic awareness children will become good spellers regardless of the type of instruction but low awareness children will become better spellers if placed in traditional classrooms with additional skill instruction. The low phonemic awareness students also benefit from daily multiple writing experiences that encourage invented spellings as their writing fluency develops.

In 1996, a study was conducted by Eldredge and Baird which compared the writing products of first grade children who were taught to write using a structured approach with children who were taught to write using a whole language approach. The study involved 49 first grade students from the same school district in the Rocky Mountain region. Twenty-three students were from a structured classroom and 23 were from a holistic group. The structured group began writing activities in March of their kndergarten year by being taught how to segment sounds in certain words, and then to write them. They were taught how to write sounds, then words, then sentences, and finally, whole compositions. This group was taught to hear basic speech sounds and to represent those sounds by letter. When the fifteen minute per day phonemic training was

completed, the children were able to say a word to themselves, isolate the sounds in the words, and convert the sounds to print.

In February, writing samples were taken from children in both the structured and holistic group. The writing was evaluated holistically by the Diederich Scale (Kirby & Liner, 1981, p. 190-193) which weighed content and organization 50%, aspects of style 30& and mechanics 20%. The writings were also evaluated on the basis of 1) number of words written; 2) number off unique words written; 3) number of low frequency or difficult words written; 4) number of communication units used; 5) overall writing quality according to the Diederich Scale; 6) number of words spelled correctly; and, 7) number of unique words spelled correctly. (Eldredge & Baird, 992).

"Magnitude of effect estimates indicated that the structured group performed 1.22 standard deviation units better, on average, than did the holistic group on the number of words written in their compositions. This would be approximately equivalent to a 37 percentile point difference in performance between the structured and holistic groups on this measure" (Eldredge & Baird, 1992, p. 201). Results of this study also estimates that the structured group outperformed the holistic goup by an average of 35 percentile points on the number of different words written; and 21 percentile points on the difficult words written.

There were two major finding in the Eldredge & Baird (1996) study. First, the writing samples of children in the structured group were superior to the writing samples of the holistic group. The treatment effects of the writing and spelling variables was large with the range between the highest and lowest magnitude of effect estimate .63 to 2.33 standard deviation units. The children in the structured writing group had significantly more correct spellings than the holistic group, but they also had more misspellings due to their attempt to write more different words and use more total words

in their compositions. Helping young children spell words by sounds may result in more misspellings in their written compositions but not negatively affect their spelling development. In fact, the findings of this study support other studies suggesting that spelling improvement is enhanced when children are provided with phonemic awareness and phonics training (Beer & Henderson, 1977; Read, 1971; Morris, 1983; Juel, Griffith, & Gough, 1986; Lundberg, Frost & Peterson, 1988).

In conclusion of the research and studies presented, phonemic awareness is a powerful tool in the training of letter/sound connections with primary students. This ability is related to segmenting sounds and their represented letters which enables students to begin the "invented writing" process. Students can be successfully trained in phonemic awareness and transfer that skill to writing words which contain the phonetic spellings of the auditory sounds. Low achieving students may not reach the same level of writing and spelling skills that high achieving students do, but they definitely show improvement as a result of the explicit training in phonemic awareness and letter name and letter-sound correspondences. Studies have shown that the low achieving phonemic awareness student benefit the most from the phonemic awareness training and demonstrate the greatest gains in their levels of invented spelling. The quality of young children's writing is definitely enhanced by the explicit training of phonemic awareness.

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Appendices

Appendix A

Number of words correctly identified in the Auditory Discrimination Assessment
Total number of words = 17

Control Sample	May of Kindergarten	January of First Grade
Student 1	17	17
2	17	17
3	17	17
4	17	17
5	17	17
6	17	17
7	17	17
8	17	17
9	17	16
10	17	17
11	17	16

Experimental	May of Kindergarten	January of First Grade
Student 1	8	16
2	0	17
3	1	17
4	17	17
5	17	17
6	8	17
7	17	17
8	3	17
9	17	16
10	7	17
11	17	17
12	17	17

Appendix B

Individual Student Developmental Level Scores for Individual Words on Word Awareness Writing Activity

Word	Control Sample		Experimental Sample	
	May/Kdg.	Jan./First Gr.	May/Kdg.	Jan./First Gr.
bed				
Student 1	5	5	1	2
2	5	5	3	5
3	3	5	1	5
4	3	5	3	3
5	3	2	5	5
6	5	5	2	3
7	3	5	5	3
8	3	5	1	5
9	5	3	1	2
10	5	3	3	3
11	3	3	1	1
12	-	-	3	3
Mean=	3.91	4.18	2.42	3.33
truck				
Student 1	4	5	1	3
2	1	4	3	3
3	1	3	1	3
4	3	5	1	3
5	1	1	2	3
6	4	3	2	2
7	4	5	3	3
8	1	5	0	2
9	3	3	1	1
10	3	2	1	2
11	3	3	1	3
12	-	-	2	4
Mean=	2.55	3.55	1.50	2.67

letter

Student 1	4	5	1	2
2	2	3	2	4
3	1	3	1	3
4	3	4	3	3
5	1	3	3	3
6	4	3	1	3
7	5	4	5	3
8	3	4	1	3
9	3	3	1	1
10	5	3	1	3
11	3	3	1	3
12	-	-	3	3
Mean=	3.09	3.45	1.92	2.83

bumpy

Student 1	4	4	1	2
2	2	3	2	3
3	1	3	1	2
4	2	3	3	3
5	2	3	2	4
6	5	3	1	2
7	5	4	4	2
8	1	3	0	2
9	3	4	1	2
10	5	4	1	3
11	3	3	1	2
12	-	-	2	4
Mean=	3.00	3.27	1.58	2.58

dress

Student 1	4	5	1	3
2	2	3	2	3
3	1	3	1	3
4	3	5	2	3
5	1	2	2	3
6	2	3	1	3
7	5	5	5	3
8	1	3	0	3
9	2	3	1	2
10	5	2	1	2
11	3	4	1	3
12	-	-	2	3
Mean=	2.64	3.45	1.58	2.83

jail

Student 1	4	5	1	4
2	2	3	2	3
3	1	5	1	3
4	1	4	2	3
5	1	1	2	3
6	2	3	1	3
7	2	4	2	3
8	3	3	0	3
9	2	3	1	2
10	2	3	1	3
11	3	3	1	3
12	-	-	3	3
Mean=	2.09	3.36	1.42	3.00

feet

Student 1	5	5	1	3
2	2	5	2	3
3	1	5	1	3
4	3	5	3	3
5	2	3	3	5
6	3	3	1	3
7	5	5	5	3
8	3	3	0	3
9	3	5	1	2
10	5	5	1	3
11	3	4	1	3
12	-	-	3	3
Mean=	3.18	4.36	1.83	3.08

shopping

Student 1	4	4	1	2
2	2	3	2	2
3	1	3	1	3
4	1	4	2	3
5	2	3	2	4
6	1	2	1	2
7	3	5	3	3
8	1	3	0	3
9	2	3	1	1
10	3	3	1	3
11	2	3	1	2
12	-	-	1	3
Mean=	2.00	3.27	1.33	2.58

monster

Student 1	4	5	1	3
2	2	3	2	3
3	3	4	3	3
4	3	3	2	3
5	3	3	1	3
6	3	3	4	3
7	3	3	0	3
8	2	3	1	2
9	5	4	1	3
10	3	3	0	2
11	2	3	1	3
12	-	-	2	3
Mean=	3.00	3.36	1.50	2.83

raced

Student 1	3	3	1	3
2	3	3	2	3
3	2	3	1	3
4	3	3	2	3
5	3	3	2	3
6	3	3	1	3
7	3	3	3	3
8	3	3	0	3
9	2	3	1	2
10	3	3	1	3
11	3	3	1	3
12	-	-	2	3
Mean=	2.82	3.00	1.42	2.92

boat

Student 1	3	5	1	3
2	2	3	3	3
3	2	3	1	3
4	3	3	2	3
5	3	3	3	3
6	3	3	3	3
7	3	3	3	3
8	3	2	0	3
9	3	3	1	3
10	3	3	1	3
11	3	3	1	3
12	-	-	2	3
Mean=	2.82	3.09	1.75	3.00

hide

Student 1	**3**	**5**	**1**	**3**
2	**2**	**3**	**2**	**3**
3	**2**	**3**	**1**	**3**
4	**3**	**3**	**2**	**3**
5	**3**	**2**	**2**	**2**
6	**3**	**3**	**2**	**3**
7	**3**	**3**	**3**	**3**
8	**3**	**3**	**0**	**3**
9	**2**	**3**	**1**	**5**
10	**3**	**2**	**1**	**1**
11	**2**	**2**	**1**	**2**
12	**-**	**-**	**2**	**3**
Mean=	**2.64**	**2.91**	**1.50**	**2.83**

Appendix C

Total Word Awareness Writing Activity Scores for Individual Students

Twelve words were scored using a holistic chart ranging from 0 for no response to 5 for correct spellings.

	Control Sample		Experimental Sample	
	May/Kdg.	**Jan./First Gr.**	**May/Kdg.**	**Jan./First Gr.**
Student 1	47	56	12	33
2	27	41	27	38
3	18	46	12	37
4	31	48	28	36
5	25	29	30	39
6	38	37	17	33
7	41	49	45	35
8	28	40	2	36
9	32	39	12	25
10	44	36	14	32
11	32	36	11	30
12	--	--	27	38

Appendix D

Total number of words results from Writing Samples

	May of Kindergarten			January of First Grade		
	Total Number of words	Words spelled correctly	Words spelled phonetically	Total Number of words	Words spelled correctly	Words spelled phonetically
Control						
Student 1	6	3	3	10	10	0
2	1	0	1	11	7	4
3	11	6	5	24	13	11
4	11	4	7	28	12	16
5	9	4	5	10	2	8
6	6	4	2	18	7	11
7	4	2	2	10	9	1
8	3	2	1	10	4	6
9	5	3	2	40	23	17
10	5	4	1	23	12	11
11	11	5	6	18	8	10
Experimental						
Student 1	0	0	0	8	2	6
2	4	1	3	16	5	11
3	0	0	0	7	1	6
4	4	1	3	8	2	6
5	9	2	7	17	10	7
6	6	5	1	11	4	7
7	5	3	2	22	13	9
8	0	0	0	4	2	2
9	0	0	0	5	0	5
10	1	0	1	12	5	7
11	0	0	0	12	4	8
12	0	0	0	21	4	17

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