

The Impact of a Training Program in
Phonological Awareness on Children's Early Writing

Christina Graham

Department of Graduate and Undergraduate
Studies in Education

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Faculty of Education
Brock University
St. Catharines, Ontario

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Abstract

This study examined the effects that a training program in phonological awareness had on the early writing skills of children in a Grade One class in the Lincoln County Separate School system.

The intent of the training program was to provide consistent and systematic practice in the manipulation of the phonological structure of language. The games and activities of the training program were related to a framework of developmental phonological skills and practised in a group setting during an unstructured period of the regular classroom schedule. The training program operated three days in a six-day cycle for approximately twenty minutes a day, from November until mid-March.

All children were tested at the outset and conclusion of the study to determine level of functioning in letter identification, word recognition, verbal intelligence, phonological awareness and spelling.

Results of the pre-tests and post-tests were compared to determine differences between the experimental and control groups over time. In addition, a systematic analysis of the children's writing looked at the development of the spelling of regular and irregular words.

The results of this study provided strong support for

the hypothesis that the treatment group would progress through the stages of early writing development more quickly than children without such training. On the basis of differences between the groups over time, it was evident that training in phonological awareness had a direct positive effect on the spelling of regular words for children during the early stages of writing. The training program did not have a significant effect on the spelling of irregular words.

Test results evaluating phonological awareness indicated a significant difference within each group over time but no significance between the groups during the experimental period. It would appear that the results of these tests reflect maturational changes in the child rather than causal effects of the training program. Nor did the effects of the training program transfer significantly to other aspects of language.

Although some of the hypotheses considered were not supported by the study, the results do indicate that children during the early stages of writing development can benefit from a training program in phonological awareness.

The theoretical direction for effective programming as a result of this study is discussed. The educational implications of training phonological awareness concurrent to beginning efforts in writing are considered.

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CHAPTER ONE: INTRODUCTION

This study is an examination of the effects of a training program in phonological awareness on children's early writing skills.

Background to the Problem

Whole language classrooms currently in operation in many Ontario schools encourage early writers to manipulate the phonetic elements of words and to write using their own spelling system. This current practice asks the teacher to provide an environment which promotes new discoveries about the connection between sound and print for the very young child. Children are encouraged to explore and discover the rules governing the world of printed language. As early as Junior Kindergarten, students are encouraged to use nonstandard judgement about the sounds of speech. Studies which have focused on early writing show that many children represent the sounds of speech in print before they can read (Chomsky, 1971). Chomsky has suggested that early writing helps children explore and experiment with the same letter/sound relationships they will ultimately use in reading.

According to J. W. Beers (1976), researchers now hypothesize that children internalize information about

spoken and written words, organize that information, construct tentative rules based on that information and apply these rules to spelling words. In fact, this hypothesis has been challenged (Beers & Henderson, 1977; Read, 1971) and results show the preschool and early primary child relies heavily on phonological awareness in early writing attempts.

The desire to write without a standard spelling repertoire compels the young writer to create ways of expressing ideas in written format. The resultant created spellings are often referred to as invented spelling (Read, 1971) in the literature. In the early stages of invented spelling, children represent sounds in words according to the similarity between the sounds in the words and the name of some letter in the alphabet (Read, 1971). Children later attempt to provide a phonetic mapping of letters to all sounds they perceive (Read, 1971). This process requires the child to exaggerate the production of speech sounds and map a letter to each sound identified.

Children's first efforts in spelling are strongly influenced by speech sounds and how sounds are articulated. Adults do not necessarily make the same phonetic judgements about sounds and spelling as primary children do (Read, 1973). Therefore, some quite frequent patterns in beginning spelling look bizarre to the adult but reflect phonetic judgements that have a genuine physical basis for the child

(Read, 1986). Results of an in-depth study of the phonetic bases of nonstandard spellings of twenty children, aged three to six, essentially delineated a process of linguistic awareness which illustrated a developmental pattern (Read, 1971). Findings from the study indicated that young children have an unconscious knowledge of the sound system of the English language. Read's examination of preschool writing development indicated the systematic nature of their early phonological judgement about spelling.

In order to write language, children must be able to use their unconscious knowledge of the phonological system of their language at a conscious level (Richgels, 1986a). The process of writing requires the specific analysis of the spoken word into smaller units. The oral and written manipulation of sounds and words enables the child to make the connection between sound and print. This manipulation assists the child in internalizing the pattern consistencies and enlarge their standard spelling repertoire (Read, 1986; Henderson, 1990). It is apparent that phonological skills play a significant role in the production of written language.

Phonological awareness encompasses the young child's ability to discriminate the phonological units of language. The child's acquisition of phonological awareness is a crucially important achievement which does not occur all at once, but develops gradually over a period of years

(Lundberg, Frost & Peterson, 1988; Read, 1971). The developmental sequence of phonological processes as described by Read (1973) and Lundberg et al. (1988) includes:

1. the concept of rhyme;
2. the segmented nature of spoken language -- sentences into words, syllabication;
3. sound associations;
4. the concept of word;
5. isolation of beginning sounds in words;
6. isolation of final sounds in words;
7. phonemic segmentation;
9. blending phonemes to create a word.

While the accumulating research evidence (Griffith, 1989; Hohn & Ehri, 1983; Liberman & Shankweiler, 1985; Lundberg et al., 1988; Mann, Tobin & Wilson, 1987; Perin, 1983; Rohl & Tunmer, 1988; Treiman and Baron, 1983) points to the importance of the child's being aware of the phonological properties of words, it is important to note the difficulties involved in acquiring this awareness.

When children do begin to attend to the spoken word, they are faced with a particularly difficult analysis task. In essence, there is no simple one-to-one correspondence between the segments of the speech signal and the phonemes that are heard. Often there is no acoustic criterion to indicate where one phoneme ends in a word and another

begins. Because the acoustic structure of a word does not match one-to-one with its phonemic structure, the task of phonemic segmentation becomes very difficult for the child.

In contrast, however, a review of the research in speech perception shows the vocalic nucleus of the syllable does contain a peak of acoustic energy (Gibson & Levin, 1975). This peak of energy allows the child to discover the number of syllables in an utterance and do explicit syllable segmentation.

Of the two types of sublexical phonological units, syllables and phonemes, phonemic segmentation presents greater difficulty for the young child than syllable segmentation. Subsequently, phonemic segmentation develops only after syllable segmentation has been mastered (Liberman, Shankweiler, Fischer & Carter, 1974).

Given that phonological awareness has been proven to be a true prerequisite which facilitates reading and spelling success (Liberman & Shankweiler, 1985; Liberman et al., 1974; Perin, 1983; Rohl & Tunmer, 1988; Treiman & Baron, 1983; Zifcak, 1981), and since there are methods of training phonological awareness in young children (Frost & Peterson, 1988; Lewkowicz, 1972; Lundberg), some implications for educational programming must be considered.

As educators, we must develop strategies in the instructional process which will develop phonological competence in productive ways. We have a responsibility to

develop the skills necessary to make the task of writing and reading less demanding for the young child.

The question as to whether instructional programming can indeed enhance phonological awareness and subsequently have a positive impact upon early writing skills is a crucial question, and one which will be the focus of this study.

The writing skills dealt with in this study pertain to the early skills exhibited by most children from preschool to the end of Grade One. It does not consider such sophisticated writing skills as punctuation, capitalization and formal grammar rules. Rather, it looks at the developmental stages of writing and spelling as outlined in studies by Read (1971, 1973), Henderson and Beers (1980) and Gentry (1982).

Statement of the Problem

This study examined the effects that a training program in phonological awareness had on the early writing skills of children in a Grade One class in the Lincoln County Separate School system. More specifically, the following hypotheses were investigated:

1. The phonological training program would lead to gains in at least two aspects of written language:
 - (a) children with such training would progress

through Read's (1971) stages of development more quickly than children without such training; and

- (b) children with such training would show gains in spelling not seen in children without such training.
2. The phonological training program would lead to gains in the area of phonological awareness as measured by the Lindamood Auditory Conceptualization Test and the Rosner Test.
 3. The phonological training program might be associated with gains in other aspects of language such as reading and vocabulary; hence, a word identification test and receptive vocabulary test were administered.

Importance of the Study

Children come to school at different stages in their phonological development. What is needed is a developmental program in phonological awareness which is systematic in nature and consequently meets the varying needs of students in the early years.

Many early childhood programs provide opportunities for young children to develop written language skills well before formal reading instruction. Attempts at early

writing is a natural beginning to the process of reading as it seems reasonable for children to read their own text before reading the text of others (Chomsky, 1971).

If component processes such as phonemic segmentation, letter/sound relations and print/speech mapping can be integrated from the outset of acquisition, the learner should move closer to the attainment of proficiency (Hohn & Ehri, 1983).

When compared to the research on phonological awareness and reading, the study of phonological awareness and children's early writing has been all but forgotten. However, questions concerning the relationship between phonological awareness and children's early writing do exist. If, indeed, relationships do exist, their nature and extent need to be determined. Positive empirical evidence will have direct implications for instructional practice.

Definitions

Orthography: The representation of the sounds of a language by written or printed symbols.

Phoneme: A minimal speech unit that functions to indicate a difference in meaning.

Phonetics: The study, analysis and classification of speech sounds, especially their pronunciation and acoustic properties.

Phonological Awareness: Appreciation that spoken utterances consist of sequences of phonemes.

Phonology: The study of the system of sound patterns that occur in language.

Limitations of the Study

1. The training program implemented for the purpose of this study did not consider auditory acuity, accent or speed of processing.
2. This study pertains only to Grade One students and did not include students of Junior or Senior Kindergarten.
3. The conclusions drawn from this study are applicable specifically to children in Grade One classes in the Lincoln County Separate School system. The population is taken from there and therefore cannot be generalized.

Outline of the Remainder of the Document

Although there are few studies which examine the relationship of phonological awareness and children's writing skills, the literature reviewed over the next several pages clearly shows the importance of phonological awareness in reading and spelling acquisition. Also, of significant importance is the developmental nature of

children's early writing and the incorporation of phonological processing skills in the acquisition of written language skills. These concepts are also considered in the literature review.

The actual training program used in the present study is a replication of the program used in the study by Lundberg, Frost and Peterson (1988).

The third chapter examines the research design utilized for the purpose of this study and the rationale for choosing this particular design. The subject selection, procedures used in the training program and data gathering procedures are also outlined. Finally, the method used in the analysis of the results is discussed.

The final two chapters discuss the results of the study with reference to limitations within the design. Ultimately, conclusions are drawn with recommendations for further research in this area.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

Historical Background

A review of literature that describes the importance of phonological awareness in early reading and writing is appropriate as the theoretical and empirical work in this area provides the background for the present study. Initially, in the literature review, a brief historical overview of the research on the developmental nature of phonological awareness is presented. Subsequently, the relationship of this developmental pattern to early writing and reading is considered. Finally, the impact of phonological training programs is addressed.

For the young writer, linguistic awareness involves the sequential development of knowledge about the linguistic structure of words, syllables and, finally, phonemes.

In order to write a language using an alphabet, it becomes necessary to abstract segments from the acoustic stream of speech. Words are the first segments abstracted by the child and take priority in his analysis of speech (Gibson & Levin, 1975).

A study by Read (1971) provided empirical evidence of the hierarchical nature of segmentation skills in young children. With his preschool study group, almost no nursery school children could segment words into phonemes. However,

with increasing age, significantly larger numbers of children could perform the phoneme segmentation task successfully. These sharp age trends allowed Read to conclude that chronological age influences a child's ability to segment phonetically.

Read's findings were substantiated in a later study by Liberman, Shankweiler, Fischer and Carter (1974). This study provided direct evidence of a developmental ordering of syllable and phoneme segmentation abilities in young children. By means of a task which required preschool, Kindergarten and first-grade children to tap out the number of segments in spoken utterances, it was found that, though ability in both syllable and phoneme segmentation increased with grade level, analysis of the phoneme was significantly harder and perfected later than analysis of syllables.

Of the two types of sublexical phonological units, syllables and phonemes, phonemic segmentation presented greater difficulty for the preschool child than syllable segmentation. Subsequently, phonemic segmentation develops only after syllable segmentation has been mastered (Liberman et al., 1974).

In one of the more interesting studies, Read (1973) examined the phonetic bases of nonstandard spellings of twenty children aged three to six. The study established evidence of a process of linguistic awareness which showed a developmental pattern. His examination indicated the

systematic nature of children's early phonological judgement and found stages of writing development to match the development of segmentation skills.

Findings from this study indicated that preschool children have an unconscious knowledge of the sound system of the English language. While first attempts at writing may not appear meaningful because of a random arrangement of letters and many incorrect spellings, Read found the children to be using letters purposefully. Using the alphabetic letter names, the children created their own spellings which Read called invented spelling. The children used the letter names and represented word sounds consistently in their efforts to spell. The systematic nature of their phonological judgement about spelling enabled Read to identify several features of invented spelling.

In the initial stages of writing development, the young child uses one or two letters to stand for the whole word. Their perception of the number and type of required letters seems to rely upon their recognition of letter names as they sound their way through the intended message.

Children later attempt to provide a phonetic mapping of letters to all sounds they perceive. The non-standard spellings which result reveal how the young child categorizes speech sounds. At this stage of development, children represent consonants and long vowels and

consistently omit short vowels. As short vowels become more evident in their spellings, there is a systematic short vowel substitution made on the basis of "similarity in place of articulation" (Read, 1973, p. 14).

The patterns of misspelled words reflect the judgements of how sounds are represented. Read found these judgements to be based upon the position of articulation and an unconscious analysis of their phonetic features (Read, 1973).

Not only was the treatment of vowel segments consistent, but the spelling patterns of preconsonantal nasals also showed a consistent pattern across all twenty cases. When /n/ or /m/ preceded a consonant, it was articulated in the same place as the consonant and, therefore, was consistently omitted by the children. Read's analysis of the study samples suggested that place of articulation was a stronger determinant of the choice of the resultant letter than was nasality (Read, 1973).

On the basis of the data collected, Read made the following judgements about children's spelling. Young children know a system of phonetic relationships that has not been taught to them. In creating their own spellings, they are analyzing and making abstract inferences about the sound system of language before they have learned to read or write. They pair spelling with segments abstractly categorized in terms of a hierarchy of articulatory

features. Their implicit organization of speech sounds in English creates a system which is different in very specific ways from that of the adult system. However, it is a system with very specifiable features (Read, 1973).

Following the impact of Read's discoveries, a number of researchers have addressed the notion of invented spelling. Beers (1976) wanted to statistically validate the spelling patterns noted in the earlier work done by Read. By using a controlled spelling list, Beers wanted to answer two key questions:

1. When asked to spell selected words over a six-month period of time, do first and second graders go through predetermined spelling patterns (i.e., no attempt, letter-name spellings, transitional errors and correct spelling)?
2. What differences occur as a function of high and low frequency in words of comparable length and phonetic structure?

Data for this study were obtained from the results of the spelling lists administered once a month from January until May. Beers found that six- and seven-year-old children do follow sequential spelling strategies and concluded that a child's knowledge about written words is acquired systematically, developmentally and gradually. The findings support the theory of the developmental nature of learning to spell.

In another study examining the developmental and conceptual aspects of spelling, Beers and Henderson (1977) analyzed the spelling changes in creative writing stories of first-grade children over a six-month period. Short and long vowel spellings, morphological markers (i.e., endings such as ed, er, s and ing, that change the meaning of a word) and various consonant spellings were examined.

Consistent with Read's earlier findings, several sequential strategies emerged for most of the children examined. A letter-name strategy was employed and articulation also played a major role in the spelling patterns examined. Nasal consonants appeared correctly in the initial, medial and final position but as a pre-consonantal nasal, the /n/ and /m/ was omitted. Supporting Read's articulation theory, there was an emergence of an awareness of letters representing sounds rather than being sounds themselves. As graphemic constratings began to be considered by the child, Beers and Henderson found a move from pronunciation as a major control (1977). This stage was referred to as a transitional stage by the researchers.

Beers and Henderson (1977) made these conclusions about children's beginning spelling strategies. Although children move through the pattern sequences at a different rate, the actual sequence of steps appeared constant for most of the children. The spelling pattern sequences themselves suggest that children develop a highly sophisticated knowledge of

English phonology. "They are actually aware of the characteristics of English sounds and have established a hierarchy of these characteristics which is used in early spelling" (Beers & Henderson, 1977, p. 40).

In a related study, Gentry (1982) analyzed the writings of one child from the age of four to ten. The writings fell into five distinct stages of development which Gentry has named:

1. Precommunicative -- The child uses symbols from the alphabet to represent his words but appears not to know about sound-symbol relationships.
2. Semiphonetic -- The child uses letter combinations to represent words.
3. Phonetic -- The child begins to represent all sound features in the desired words.
4. Transitional -- The child moves away from phonological constraints and relies more heavily on visual and morphological strategies.
5. Correct spelling -- The child is aware of English spelling rules.

The resultant stages identified by Gentry show learning to spell to be a developmental process and the stages identified correspond closely with earlier studies.

In a later study, Zifcak (1981) examined the young child's awareness of the phonology of language and its influence on early reading success. The results of the

study revealed a strong relationship between the first grader's reading performance and two measures of his phonological awareness: invented spelling and phoneme segmentation abilities.

Zifcak concluded that an understanding of phonological relationships beyond that required for ordinary speaking and listening enables the beginning reader of English to make contact with alphabetic writing system at the phonemic level (Zifcak, 1981). Spellings in early writing enable the young child to utilize this element of his sound system in his writing.

Read's findings have influenced the work of yet another researcher. Richgels (1986a) investigated children's spelling abilities using an invented spelling test. The test of early spelling ability was composed as a research tool for examination of four-year-olds' and Kindergartners' phonological awareness. Spelling was scored using Read's (1971) strategies. In addition, the subjects alphabet knowledge and letter/sound associations were also tested.

There was a high correlation between Kindergarten students spelling test results and scores on the Metropolitan Readiness Test and the Stanford Early School Achievement Test. Results suggested that children can invent their own spellings without being consciously aware of letter/sound correspondences. However, alphabet knowledge was found to be correlated to spelling

performances.

Preconventional spelling skills of kindergarten children as a measure of phonological awareness was investigated by Mann, Tobin and Wilson (1987). A Kindergarten spelling test scored with a phonological accuracy system that emphasized the extent to which the responses captured the phonological structure of the words was used in this study.

The relation between performance on the phoneme classification test and invented spelling ability confirmed that phoneme segmentation ability correlates with the phonological accuracy of invented spelling. Hence, the ability of the young child to analyze the phonological structure of spoken words is evident in their invented spellings.

Phonological abilities have been proven to be true prerequisites which facilitate reading and spelling success. Methods for training phonological awareness in young children have been carefully documented in a study by Lundberg, Frost and Peterson (1988).

The training program consisted of metalinguistic games and exercises in which 235 Danish preschool children had daily training sessions over a period of eight months. Pre- and post-test measures were also taken from a comparison group of 155 children. Subsequently, the authors assessed the long-term effects of the training program on the

children's progress in reading and spelling in first and second grades. The design of the study permitted the authors to assess the specificity of the training effects. The program affected metalinguistic skills. Significant effects were observed on rhyming tasks and on tasks involving word and syllable manipulation. The effect on tasks requiring phoneme segmentation were dramatic. Lundberg et al. (1988) concluded that phonemic awareness can be developed among preschool children outside the context of the acquisition of an alphabetic writing system.

More current studies (Perin, 1983; Rohl and Tunmer, 1988) have examined the role of phonemic segmentation skill in spelling acquisition with older students. However, orthographic knowledge influences performance on phonological segmentation tasks of the older child. Rohl concludes that:

Some minimum level of phonemic segmentation ability is necessary to acquire basic spelling skills and that the process of acquiring working knowledge of the orthographic system as a map for speech, in turn, provides the basis for performing more difficult phonological tasks. (p. 349)

In early writing, phonemic awareness may be knowledge that is constructed when the young child tries to match

speech to an alphabetic orthography (Read, 1986). Since phonemes are not objective characteristics of speech, not all orthographies will represent single speech sounds. For the young writer, then, the orthography used will be a systematic, sometimes abstract, representation of the phonological segments in spoken language (Read, 1986).

Current theory and research integrates a child's development of spelling ability with reading, language and cognitive development.

The aforementioned studies provide strong support for the validity of a training program in phonological awareness influencing children's early writing skills.

Summary of Literature Reviewed and Relevance to This Study

Given that children's phonological development follows a sequential pattern and is positively related to success in reading and writing, and that training programs have been found to have significant, positive effects in phonological tasks, there are strong implications for early childhood educators.

In light of current psycholinguistic approaches to reading currently employed in many Ontario schools, is the development of phonological skills a valid goal for educational programming? The development of such skills

does not support the psycholinguistic approach which stresses the semantic dimension and seems to pay less attention to other aspects of language structure. However, learning to read and write requires the child to reflect on the structural features of language as well as its meaning. It requires the child to process print in a qualitative manner.

Programs must provide opportunities to manipulate words so that the relationship between phonology and writing become clear. Given the opportunity to manipulate words orally and in written format, children will better internalize sound/spelling patterns.

Process writing programs which promote the use of invented spellings may be a plausible instructional mode since they encourage the child to work within a more idiosyncratic orthography, often of their own creation. Invented spellings during the early stages of writing may serve as a functional way to reinforce phoneme/grapheme correspondences.

CHAPTER THREE: METHODOLOGY

Overview

Learning to read and write depends on abilities that are language-related. Research such as the studies by Zifcak (1981); Read (1986) and Lundberg, Frost and Peterson (1988) has shown that success in these disciplines is related to the degree to which the learner is aware of the underlying phonological structures of words.

To perceive and produce written language is to manipulate phonological structures. It would seem logical, therefore, that the concept of phonemic awareness would be enhanced by actions which bring speech and print together.

Description of Research Methodology

Research Design

Prior to the beginning of the training program, the investigator applied to the Lincoln County Roman Catholic Separate School Board and the Brock University Ethics Committee for permission to conduct the study. A letter of consent was distributed to the parents of the target classroom (see Appendix A). Only those children whose parents gave written consent for participation in the program were to be included in the study (see Appendix B).

Selection of Subjects

The population for this study was drawn from one Grade One class at Canadian Martyrs School in St. Catharines during the school year 1989-1990. In fact, all children in the class participated in the study as 100% of the parents gave written consent for the children's involvement in the study. Of the twenty-two children in the class, an equal number of participants were randomly assigned to the training group and to the control group. However, one child from the experimental group moved during the course of the study. Thus, there were 11 children in the control group and ten in the experimental group. The school is located in an area of St. Catharines that is populated primarily by individuals involved in skilled trades and many of the families are second generation immigrant families. However, all of the children spoke English as their first language.

Training Program Procedures

The intent of the training program was to provide consistent and systematic practice in the manipulation of the phonological structure of language. Since the children were very young, the activities were designed to be enjoyable and place few demands upon the child. The games and activities of the training program were related to a framework of developmental phonological skills and practised in a group setting during an unstructured period of the

regular classroom schedule. The training program operated three days a cycle for approximately twenty minutes a day. It was conducted by the classroom teacher (and author of this study) in periods of time that were allotted for planning when another teacher was responsible for the class. The children in the experimental group were taken to a resource classroom for each training session while children in the control group remained in the class. The actual training program was conducted from November until mid-March.

1. The training program began with easy listening games which included nonverbal as well as verbal sounds.
2. A period of rhyming games followed using nursery rhymes, rhymed stories and games for rhyme production.
3. Sentences and words were introduced by means of games and exercises focusing on segmentation of sentences into word units.
4. Syllables were carefully introduced by clapping, dancing, marching and walking to various syllabic intonation patterns.
5. Next, plastic markers were used as manipulative representations of syllables.
6. Syllables from multisyllable words were given orally in a mixed order and asked to be rearranged

to make a sensible word.

7. Phonemes were introduced in the initial position.
8. Phonemes were introduced in the final position.
9. Phonemes were introduced in the medial position.
10. Combinations of phonemes from #7, #8 and #9 were manipulated.
11. Counting the number of phonemes in a word was done by tapping out each phoneme and/or representing each phoneme with a marker.
12. Listening for a specific phoneme in a given word and identifying its placement with a marker was also an activity of the training program.

Samples of children's writing in both the experimental and control group were collected on a regular basis and evaluated according to Read's (1973) stages of development.

Daily attendance and individual progress for each stage of the program were carefully monitored in a log. This not only enabled the principal investigator to describe in detail the training program upon its completion, but significant differences in attendance were also examined and were found not to be a confounding variable.

Instrumental and Testing Procedures

In order to control for tester bias, a Master of Education student who was blind to the purpose of the experiment administered and scored all the pre- and post-

tests.

Prior to testing, the tester participated in activities with all the children on an individual basis. This was to familiarize the tester and the children of the target classroom and possibly make the testing environment more relaxed.

Pre-Tests

All children were individually tested at the outset of the study to determine current level of functioning in word recognition, spelling, letter identification and phonological awareness.

Over a two-week period at the beginning of October, each child was involved in a testing session of approximately twenty minutes. The tests were presented in a random order.

Two separate tests were used to assess pre-reading ability. Word recognition was evaluated using the Word Identification subtest from the Woodcock Reading Mastery Tests -- Revised, Form H (American Guidance Service Inc., 1987). This test required the child to read a series of context-free words.

The children were also given the Letter Identification subtest from the Woodcock Reading Mastery Test - Form A (American Guidance Service Inc., 1973). In this subtest, the student was asked to name the upper or lower case

alphabet letter being displayed.

Form L of the Peabody Picture Vocabulary Test - Revised (1981) provided an assessment of each child's verbal intelligence.

The Rosner Test of Auditory Analysis Skills and the Lindamood Auditory Conceptualization Tests - Form A (Developmental Learning Materials Teaching Resources, 1971) were used to evaluate phonological awareness. The Lindamood required the child to code a given sound pattern using coloured blocks while the Rosner focused the child's ability to segment syllables and isolated sounds from a given word.

The aforementioned tests were used because they have been normed and preliminary work has been done by the yest authors on the validity and reliability of the tests. Moreover, they were relevant to the study.

Since this study was designed to evaluate the effects of the training program on early writing skills, the Core Spelling Test used by the Haldimand School Board was also administered. The Core Spelling Test was selected because it has proven to be a precise measure of short-term growth in spelling skills (Head, 1989) and therefore a more suitable measure given the study's time frame.

Data Collection and Recording - Post-Test

Following the completion of the training program, each child in both groups participated in the initial post-

testing session with the same tester used in the pre-test sessions.

Approximately six months after the completion of the training program, the children in the experimental and control groups again participated in individual testing sessions with a graduate student.

Results of the pre-tests and post-tests were compared to determine any differences between the experimental and control groups. This was done with a two-way split-plot analysis of variance (Kirk, 1968) in which group (i.e., experimental versus control) was the between-subjects measure, while time (i.e., pre-test versus post-test) was the within-subjects measure. This analysis made the following comparisons:

1. It compared the scores of the experimental group to those of the control group, collapsing across the time variable (i.e., main effect of group).
2. It compared the pre-test scores to the post-test scores, collapsing across the group variable (i.e., main effect of time).
3. It compared the relative changes of the two groups over time to see if either group differed at the time of the pre-test or post-test and to see if one group made differential gains or losses (i.e., Group X Time interaction). The interaction was of particular interest as the hypothesis predicted

differential gains in the experimental group as a function of the training program.

A systematic analysis of the children's writing looked at spelling, word attack skills, the number of words used and level of functioning according to Read's stages of development.

Implications

There are several issues which must be considered in such a study.

1. Was the sample size large enough to draw generalized conclusions?
2. Do the results truly reflect causal effects of the training program or do they reflect maturational changes in the child?
3. Is there evidence for a reverse causal influence?
4. Do children who do not acquire such phonological skills become deficient in written language skills?
5. Will such phonological training programs have beneficial effects on language-delayed and disadvantaged children?
6. Should such skills be linked with the semantic notion of language rather than taught in isolation in order to be more effective?
7. Will there be lasting effects of this training

program which will be transferred to new tasks,
i.e., reading/spelling?

Summary

As stated earlier, the intent of this study was to examine whether or not a training program in phonological awareness effects children's early writing. It was hoped that this investigation and its concluding report has value for educators of the young child. The results provide significant information useful in the development of programs which facilitate children's early writing.

CHAPTER FOUR: RESULTS

The children in this study were tested on three occasions:

- 1) prior to the phonological training program which began in the fall of their Grade One year;
- 2) at the completion of the four-and-one-half month program; and
- 3) in the fall of their Grade Two year.

In the following sections, the results from the first two testing sessions will be presented to determine if the program had any immediate effects. Then, the results from the Grade Two follow-up study will be discussed. A .05 significance level was adopted for all of the statistical tests. The number of subjects did not vary across tests: there were 10 children in the experimental group and 11 in the control group. Consequently, the number of subjects will not be reported in the discussion of each analysis.

Results from the Initial Study

Unless otherwise noted, the data from the initial study were analyzed using a two-way split plot ANOVA with Group (i.e., experimental versus control) as the between-subjects variable and Time (i.e., pre-test versus post-test) as the within-subjects variable. The results are discussed below

for each of the dependent variables.

As can be seen in Table 1, children in both the experimental and control groups made substantial gains on the Lindamood from the time of the pre-test to the post-test; ($F(1, 19) = 46.70$; $p < .001$). However, the children in the experimental group improved more during the experimental work period than children in the control group ($F(1, 19) = 4.61$; $p < .05$; see Figure 1).

There were no significant effects in the analysis of the Rosner A data (see Table 2 & Figure 2). While children in both the experimental and control groups made some gains over time, this effect only approached significance ($F(1, 19) = 4.1$; $p = .056$).

The ANOVA that examines performance on the Rosner B shows a difference at the .05 level of significance between pre-test and post-test scores for both the experimental and control groups; ($F(1, 19) = 5.93$; see Table 3 & Figure 3). In other words, both the experimental and control groups made gains from the time of pre-test to the post-test. However, the interaction between group and time is not significant ($F < 1$; $p = n.s.$), as children in both groups made comparable gains over time.

For the Letter Identification Test, the statistics comparing pre-test and post-test scores across all groups show a significant difference in test scores; ($F(1, 19) = 64.39$; $p < .001$). However, the interaction comparing the

Table 1. Means Scores for Experimental and Control Groups
on the Lindamood at Time of Pre- and Post-Tests
(Standard Deviations in Parentheses).

	Pre-Test	Post-Test 1	Post-Test 2
Experimental Group	29.40 (15.64)	59.50 (19.49)	70.10 (16.37)
Control Group	33.45 (19.44)	48.64 (18.06)	62.70 (22.42)

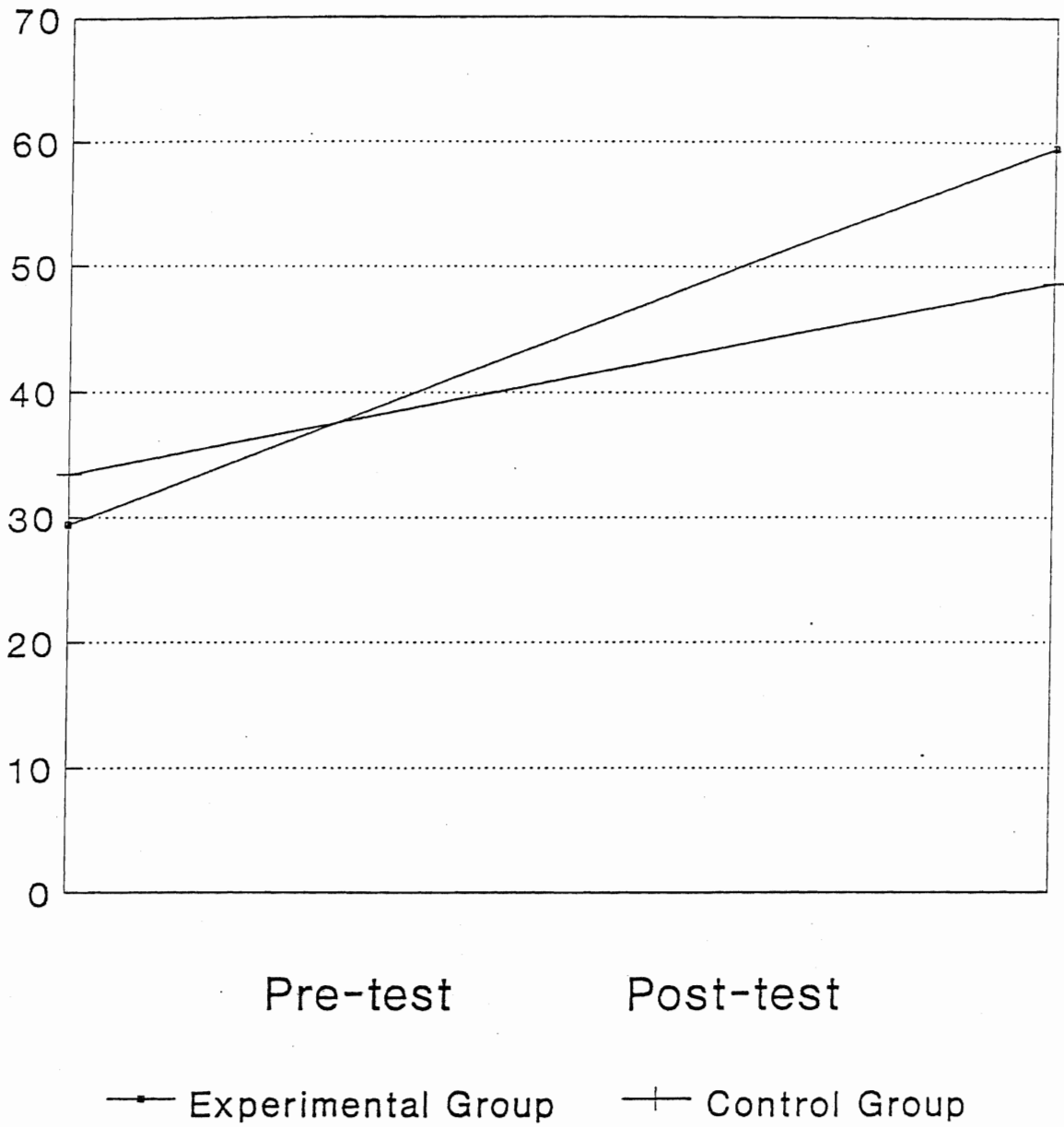


Figure 1. Mean Scores Lindamood Test.

**Table 2. Means Scores for Experimental and Control Groups
on the Rosner A at Time of Pre- and Post-Tests
(Standard Deviations in Parentheses).**

	Pre-Test	Post-Test 1	Post-Test 2
Experimental Group	5.2 (2.66)	6.7 (4.24)	8.2 (2.7)
Control Group	3.91 (2.98)	5.45 (4.0)	8.0 (2.75)

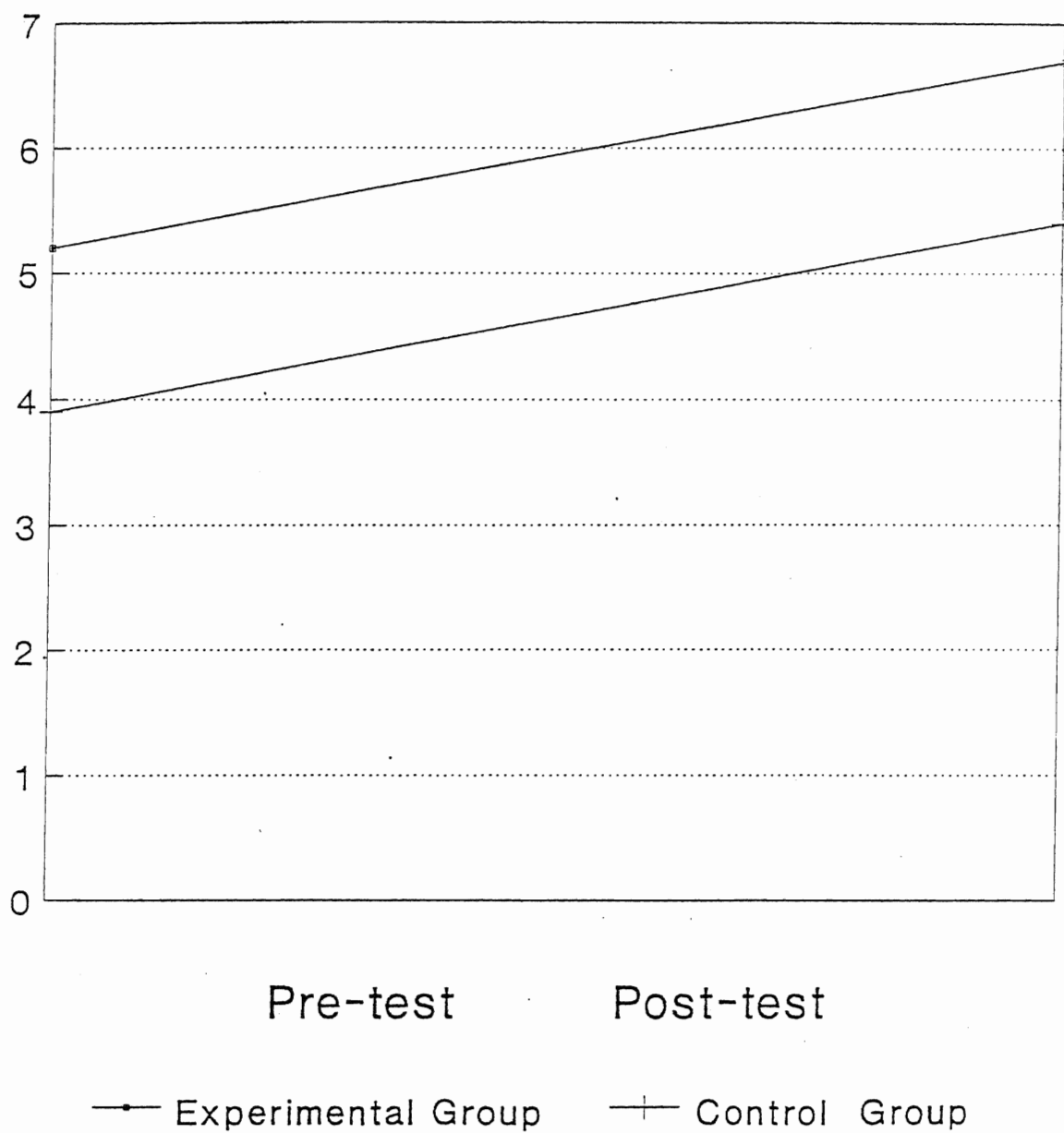


Figure 2. Mean Scores Rosner A Test.

**Table 3. Means Scores for Experimental and Control Groups
on the Rosner B at Time of Pre- and Post-Tests
(Standard Deviations in Parentheses).**

	Pre-Test	Post-Test 1	Post-Test 2
Experimental Group	6.7 (7.61)	12.0 (9.86)	17.8 (11.55)
Control Group	7.0 (9.11)	10.27 (5.29)	14.8 (8.2)

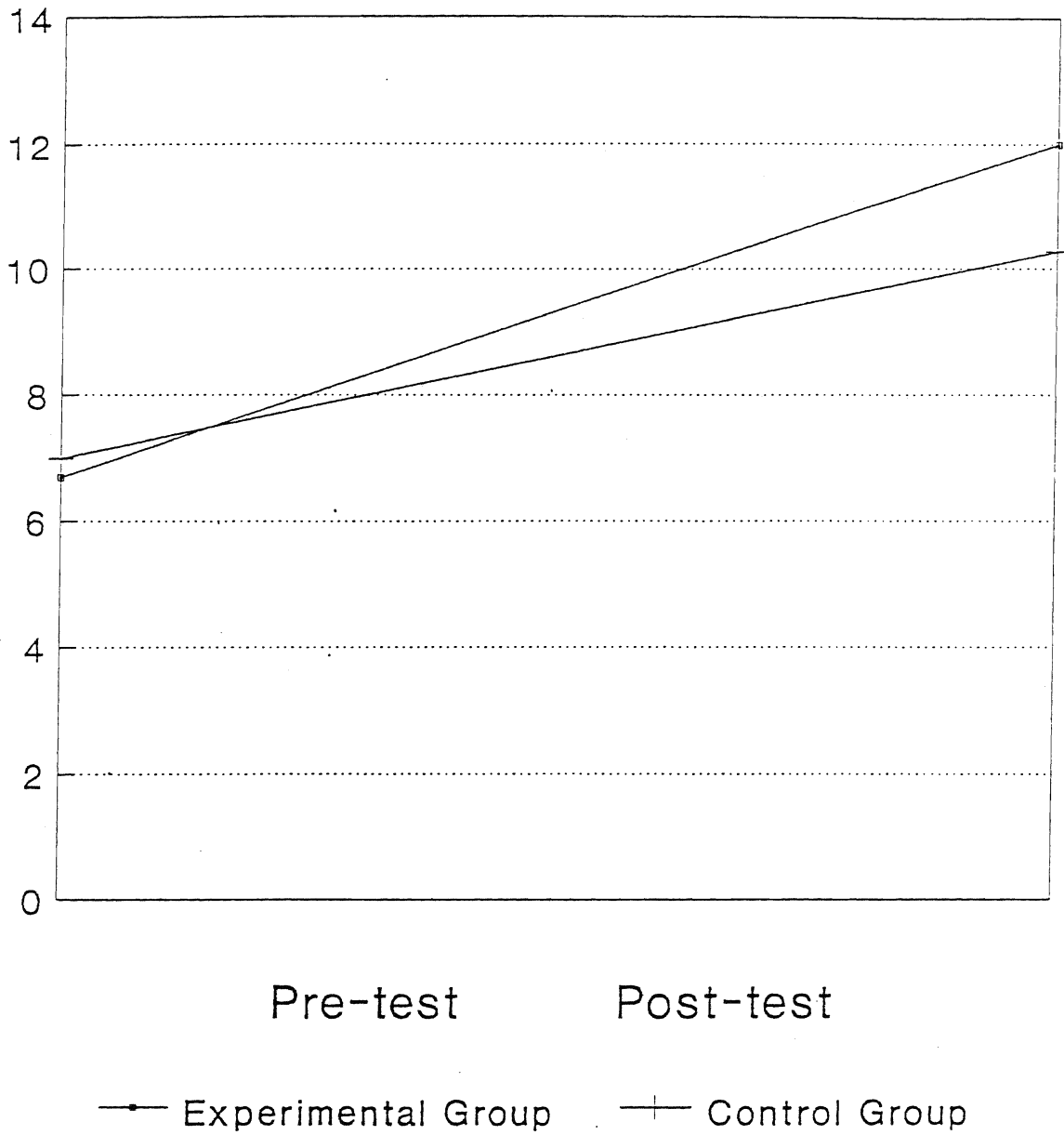


Figure 3. Mean Scores Rosner B Test.

experimental to the control group over time indicates that the groups were comparable before and after the experimental period (see Table 4 & Figure 4).

Table 5 and Figure 5 illustrate the performance of the experimental and control groups on the Woodcock Word Identification Test. The main effect of time is significant ($F(1, 19) = 43.08; p < .001$). Children in both the experimental and control groups improved on this task over time. However, both groups made equivalent gains over time so there is not a significant Group by Time interaction ($F(1, 19) < 1; p = n.s.$).

The ANOVA comparing the Peabody Picture Vocabulary Test scores of both groups over time shows a significant difference between the pre-test and post-test scores ($F(1, 19) = 33.53; p < .001$; see Table 6 & Figure 6). Although the statistic for the Peabody comparing the experimental to the control group over time does not show a significant difference in the groups at the .05 level ($F(1, 19) = 3.383; p = .08$), it appears to be approaching significance (see Figure 6).

The Core Spelling List developed by the Haldimand Board of Education for use with primary children was administered prior to the training program and at the time of the post-test. It appears that the training program had no effect on spelling since the results of the ANOVA for the between-subject effects showed no difference from the time of the

Table 4. Means Scores for Experimental and Control Groups on the Woodcock Letter Identification at Time of Pre- and Post-Tests (Standard Deviations in Parentheses).

	Pre-Test	Post-Test 1
Experimental Group	23.0 (7.97)	30.0 (4.83)
Control Group	20.1 (8.35)	27.0 (7.33)

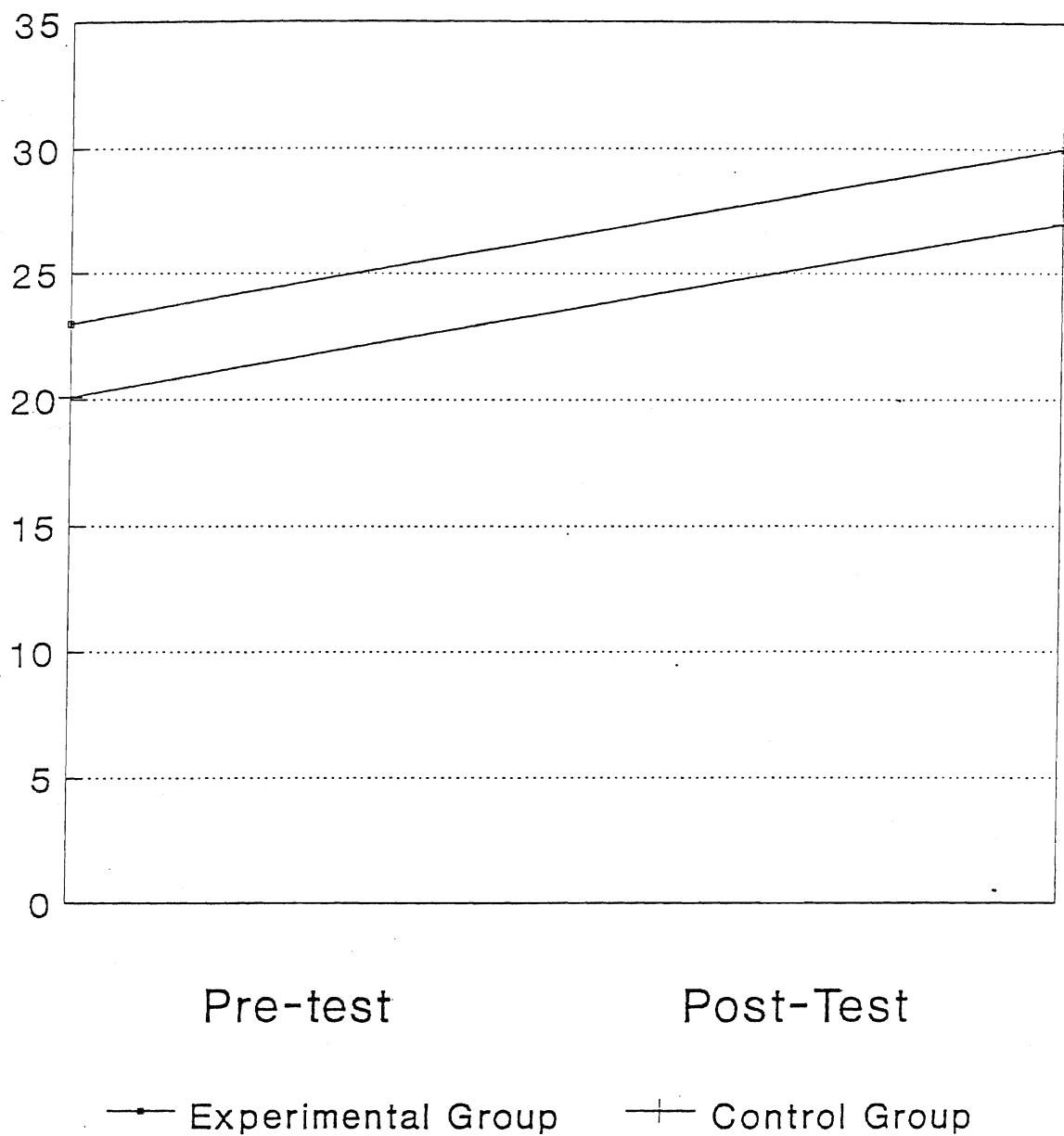


Figure 4. Mean Scores Woodcock Letter Identification Test.

Table 5. Means Scores for Experimental and Control Groups on the Woodcock Word Identification at Time of Pre- and Post-Tests (Standard Deviations in Parentheses).

	Post-Test	Post-Test 1	Post-Test 2
Experimental Group	9.1 (17.15)	13.9 (7.43)	100.5 (19.3)
Control Group	7.27 (15.7)	19.63 (20.0)	103.4 (15.4)

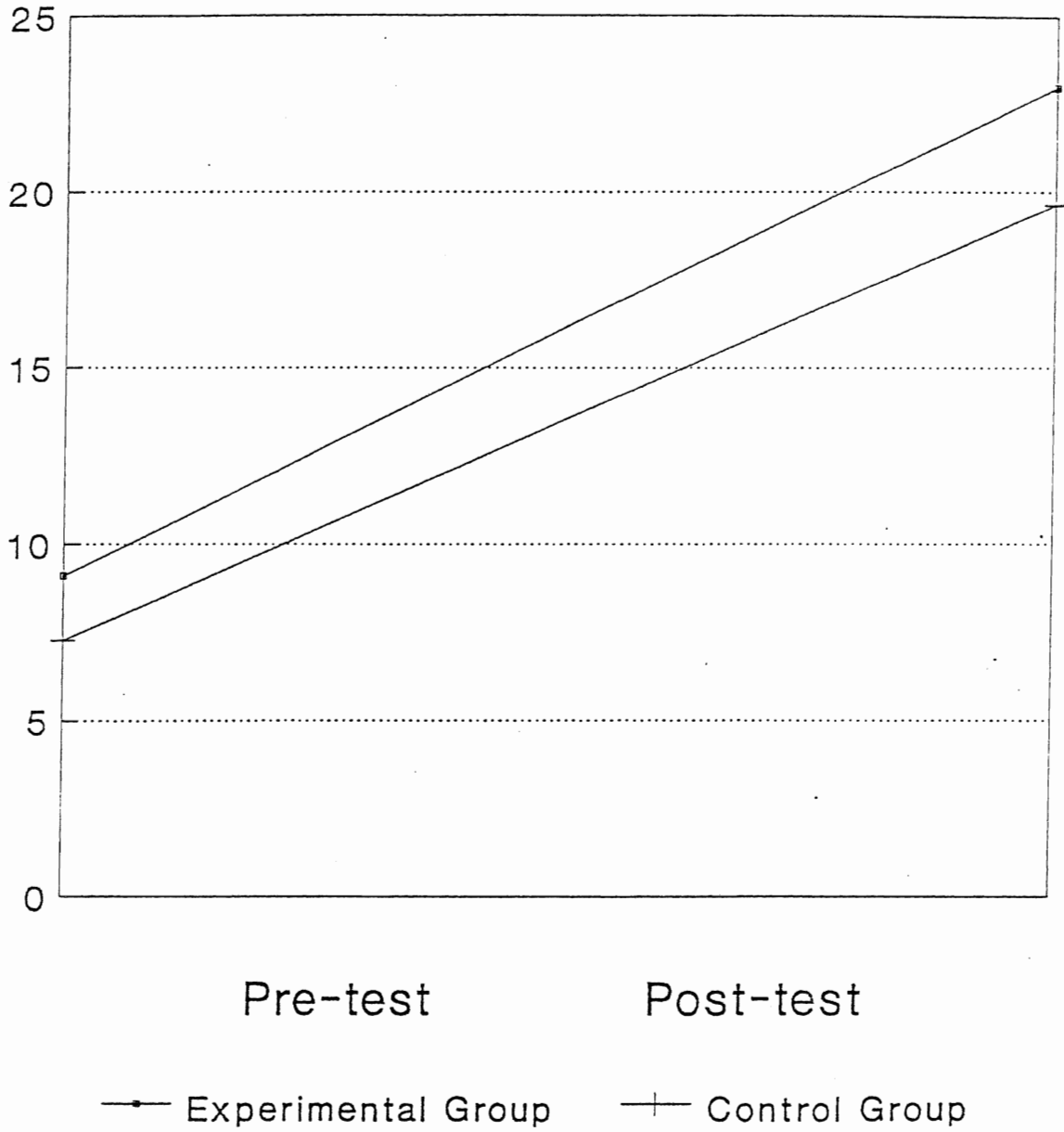


Figure 5. Mean Scores Woodcock Word Identification Test.

Table 6. Means Scores for Experimental and Control Groups on the Peabody Picture Vocabulary Test at Time of Pre- and Post-Tests (Standard Deviations in Parentheses).

	Pre-Test	Post-Test 1
Experimental Group	66.4 (12.2)	82.2 (13.28)
Control Group	69.73 (13.84)	77.91 (9.86)

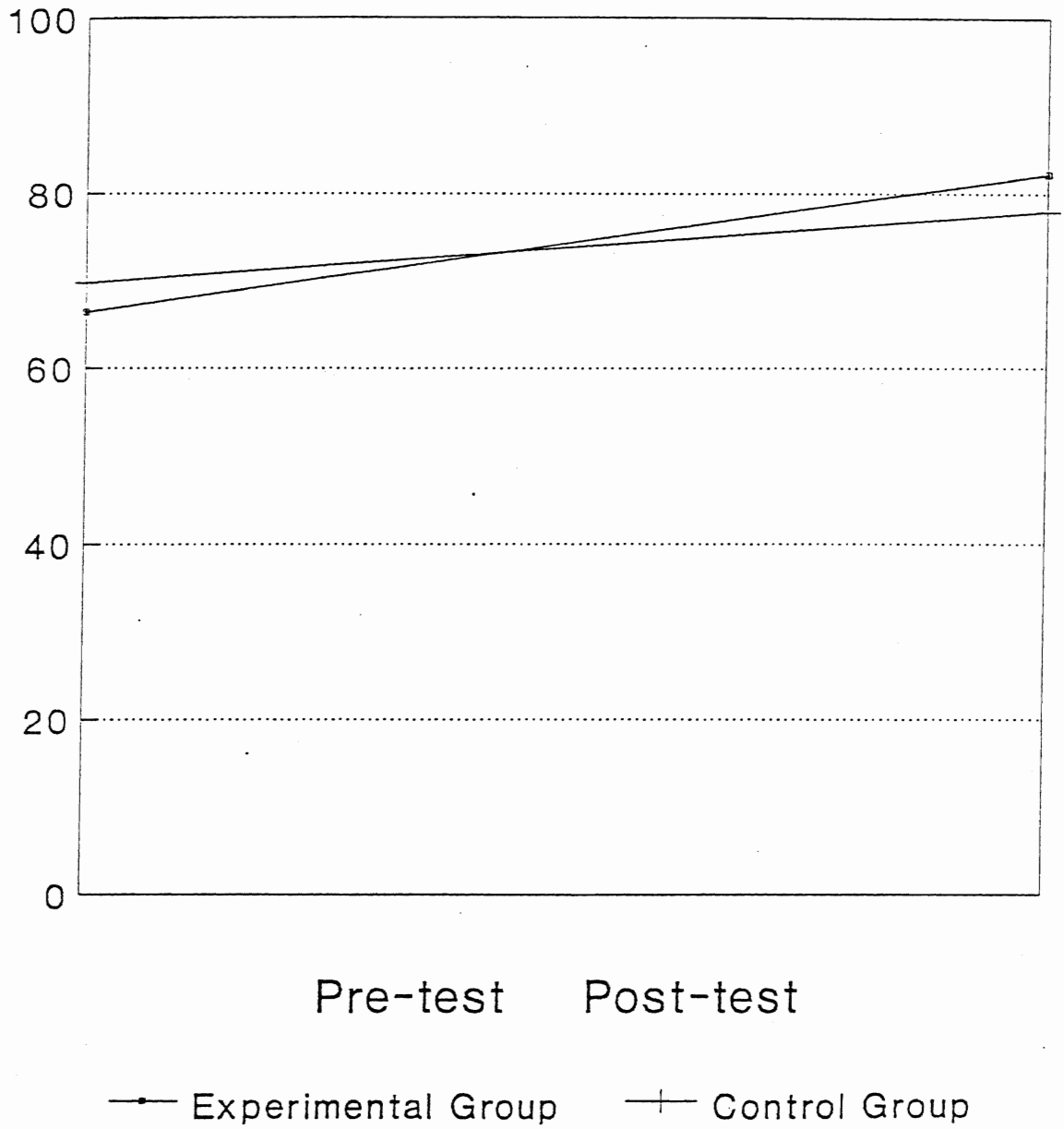


Figure 6. Mean Scores Peabody Test.

pre-test to the post-test in spelling ($F(1,19) = 1.90$, $p > .05$; see Table 7 & Figure 7). The ANOVA for the within-subject effects shows that time has influenced the children's performance in spelling as there is a highly significant change in the performance of the children in both groups over time ($F(1, 19) = 87.29$, $p < .001$). Although the experimental group does have slightly higher spelling scores relative to the control group at the time of the post-test, the difference is not significant ($F(1, 19) = 2.18$; $p = .15$).

Random samples of the children's writing were collected on four separate occasions throughout the year of the training program. Each sample was studied for the purpose of identifying numbers of correctly spelled (real words) and incorrectly spelled (invented spelling) words. The samples were then compared using a three-way split-plot ANOVA with two levels of Group, the between-subject factor, four levels of Time, the within-subjects factor, and two levels of Spelling (i.e., real versus invented). The analysis was designed to see if any changes in spelling accuracy occurred between the experimental and control groups over the study period. Table 7 summarizes the findings. The results indicate a highly significant effect of time ($F(3,57) = 13.95$, $p < .001$) as well as a significant change in real versus invented spellings in the two groups over time ($F(1, 19) = 4.85$, $p < .004$). As Table 7 shows,

Table 7. Means Scores for Experimental and Control Groups for Writing Samples and Invented Spellings at Time of Pre- and Post-Tests (Standard Deviation in Parentheses).

Experimental Group			
Fall		Spring	
Real Words	Invented Spelling	Real Words	Invented Spelling
2.5	.2	9.0	3.3
(4.2)	(.42)	(6.2)	(2.36)
Control Group			
Fall		Spring	
Real Words	Invented Spelling	Real Words	Invented Spelling
2.9	.4	6.4	3.9
(2.66)	(.69)	(3.2)	(2.1)

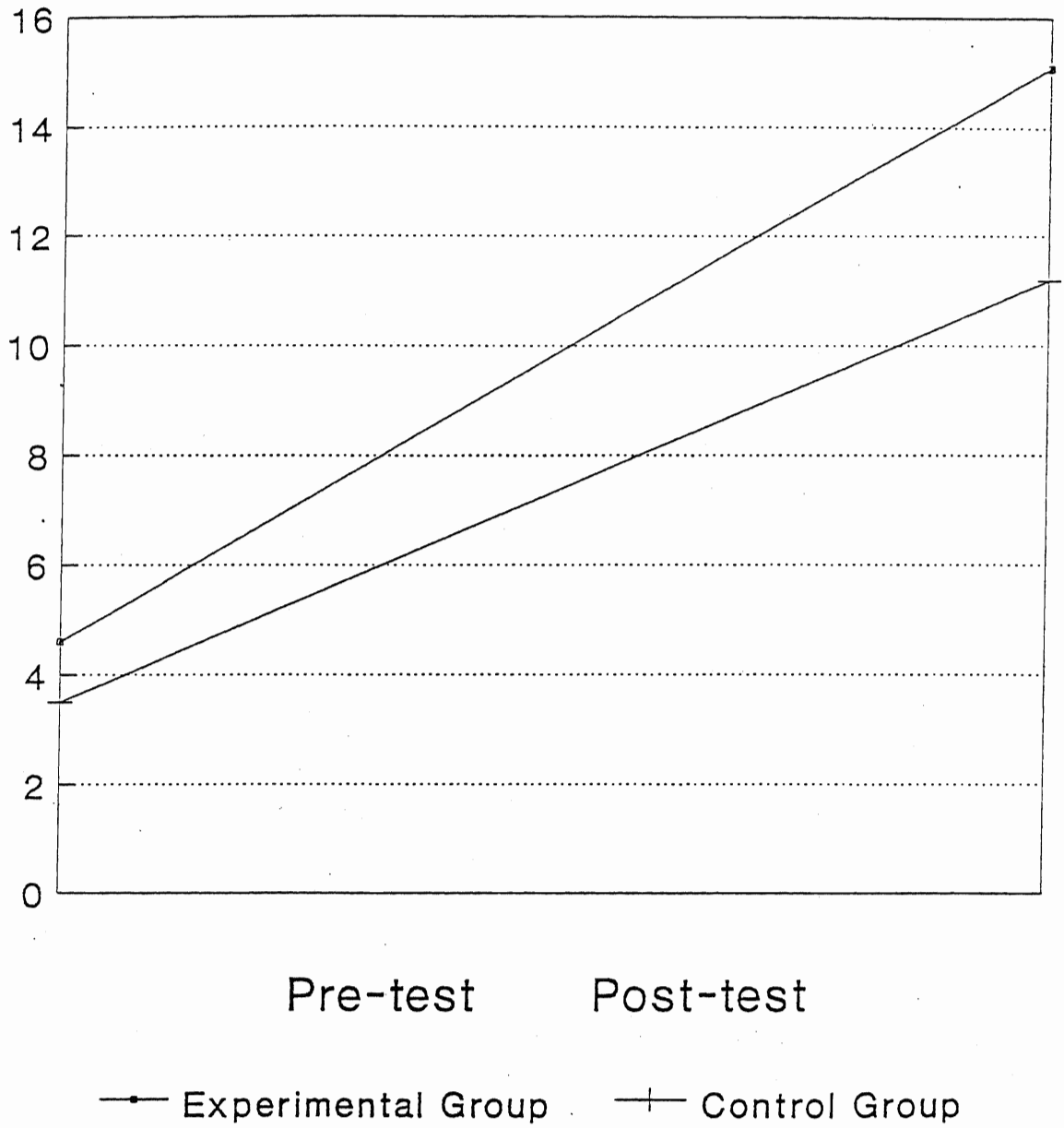


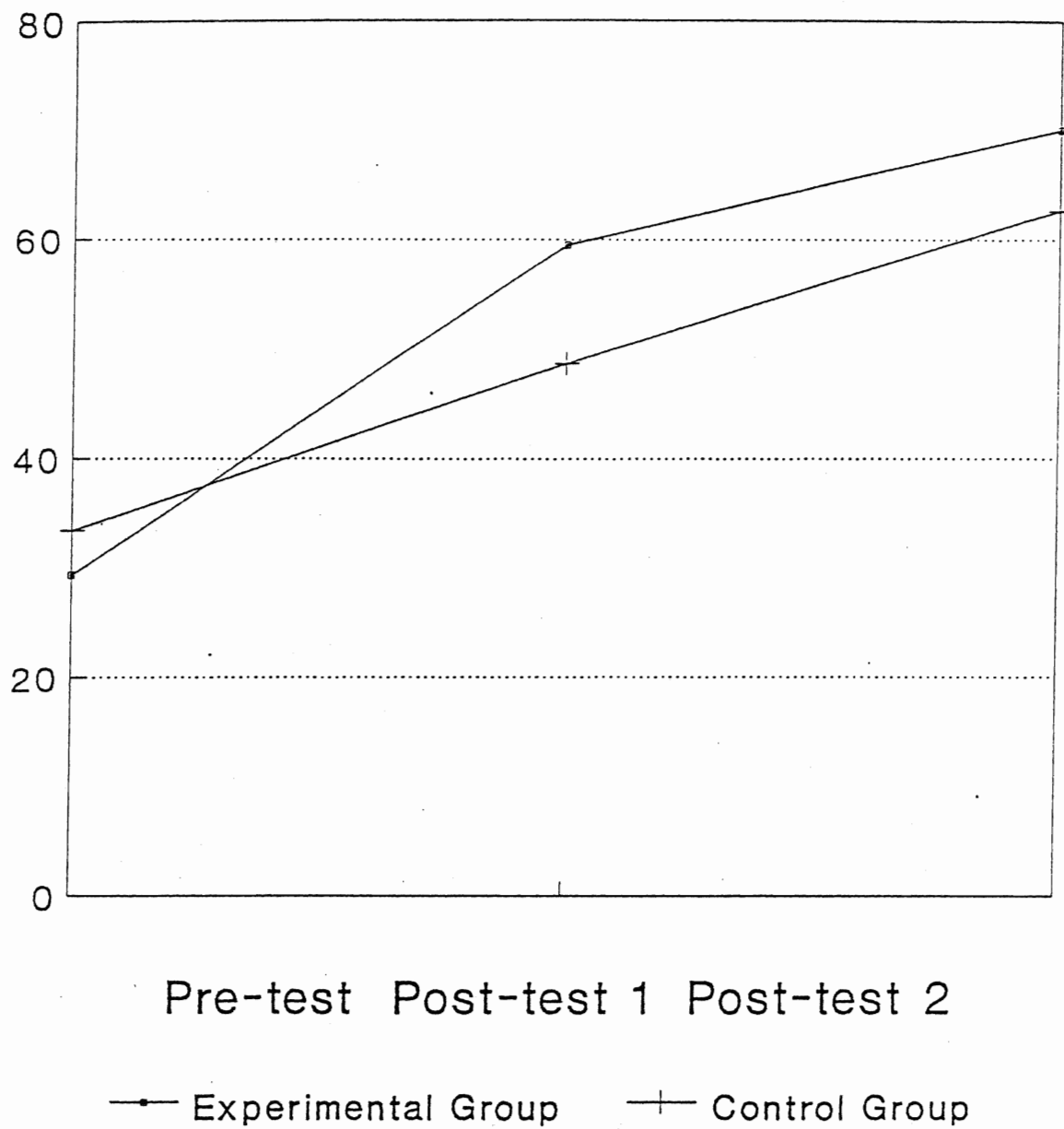
Figure 7. Mean Scores Spelling Test.

there is a greater increase in the number of real words used over time than in the number of invented spellings, but there is an overall increase in the number of both types of spellings over the course of the study. Real words are used more frequently than invented spellings ($F(1,19) = 35.39$, $p < .001$). As Table 7 shows, there was a trend for children in the experimental group to use more real spellings by the end of study than children in the control group ($F(1, 19) = 3.58$; $p = .07$), but this did not reach significance.

Follow-up Study

During the fall term, the children were tested for a third time to check for developmental trends. Two-way split-plot analyses of variance that had group as the between-subjects factor, and time (pre-test, post-test and follow-up test) as the within-subjects factor were conducted to determine if there were changes over the year that could be attributed to the experimental treatment.

Time had a highly significant effect on the children's performance on the Lindamood Auditory Conceptualization Test ($F(2, 38) = 51.75$; $p < .001$). However, as Figure 8 shows, the interaction between group and time was significant at the .05 level ($F(2, 38) = 3.14$). Children in the experimental group made gains on this test of phonological processing skills, and they maintained their superiority in



Pre-test Post-test 1 Post-test 2

—●— Experimental Group —+— Control Group

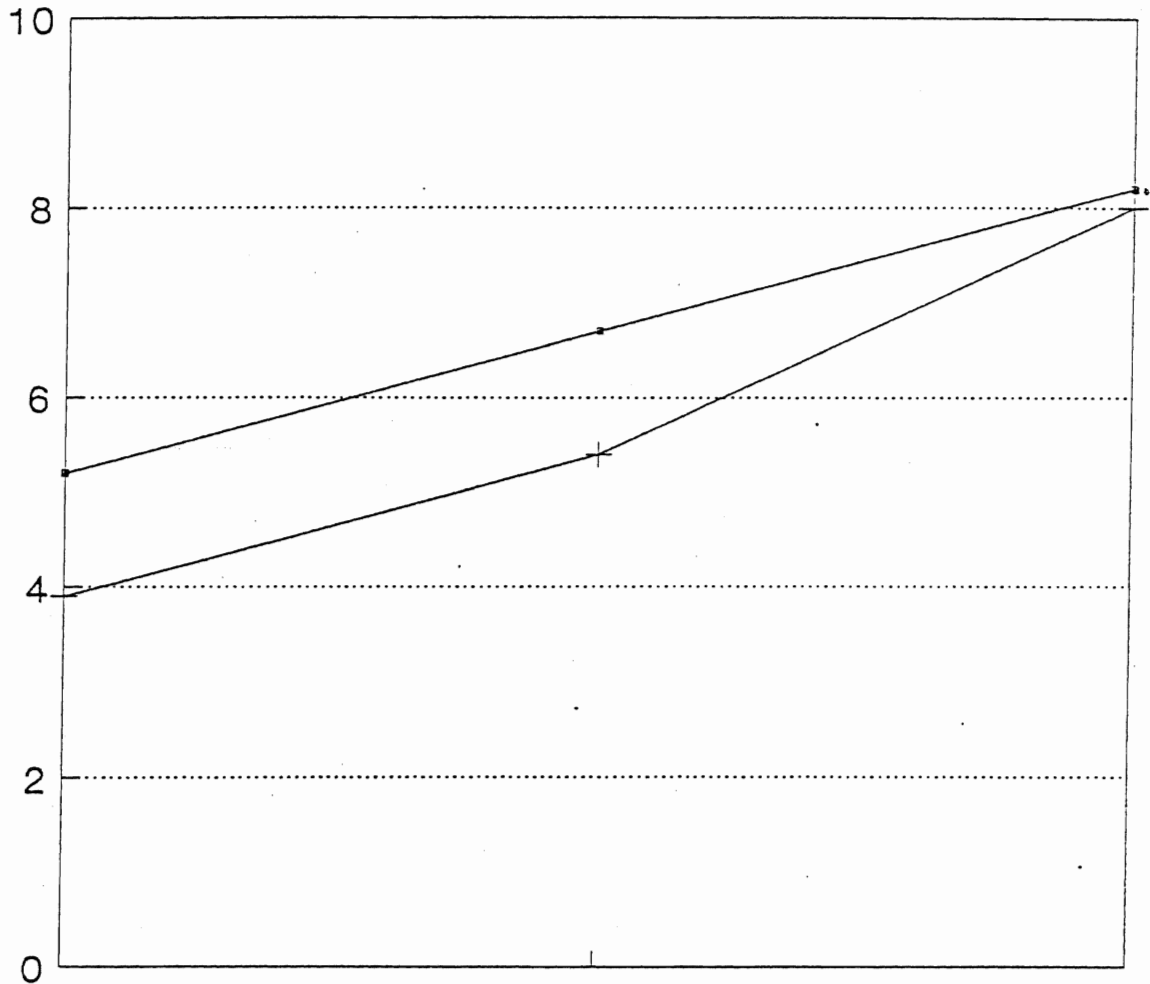
Figure 8. Mean Scores Lindamood Test.

this area into their Grade Two year.

Figures 9 and 10 illustrate the long-term changes made on the Rosner Tests of Auditory Analysis. There was no significant difference between the groups on the Rosner A. However, both groups made substantial, but parallel gains on this test over time ($F(2, 38) = 8.85; p < .001$). The same pattern of results was observed on the Rosner B, with the effect of Time being significant at the .001 level ($F(2, 38) = 8.11$).

Time had a very significant effect on the children's reading scores on the Word Identification sub-test of the Woodcock Reading Mastery Test ($F(2, 28) = 70.57; p < .001$). There were no differences as a function of the experimental program (see Figure 11).

The scores on the Haldimand Spelling List for regular and irregular words are presented in Figures 12 and 13, respectively. For regular words, the children in both groups made substantial gains over time ($F(2, 38) = 465.06; p < .001$). The same pattern of results was observed for irregular words with the main effect of time being very reliable ($F(2, 38) = 228.76; p < .001$).



Pre-test Post-test 1 Post-test 2

—■— Experimental Group —+— Control Group

Figure 9. Mean Scores Rosner A Test.

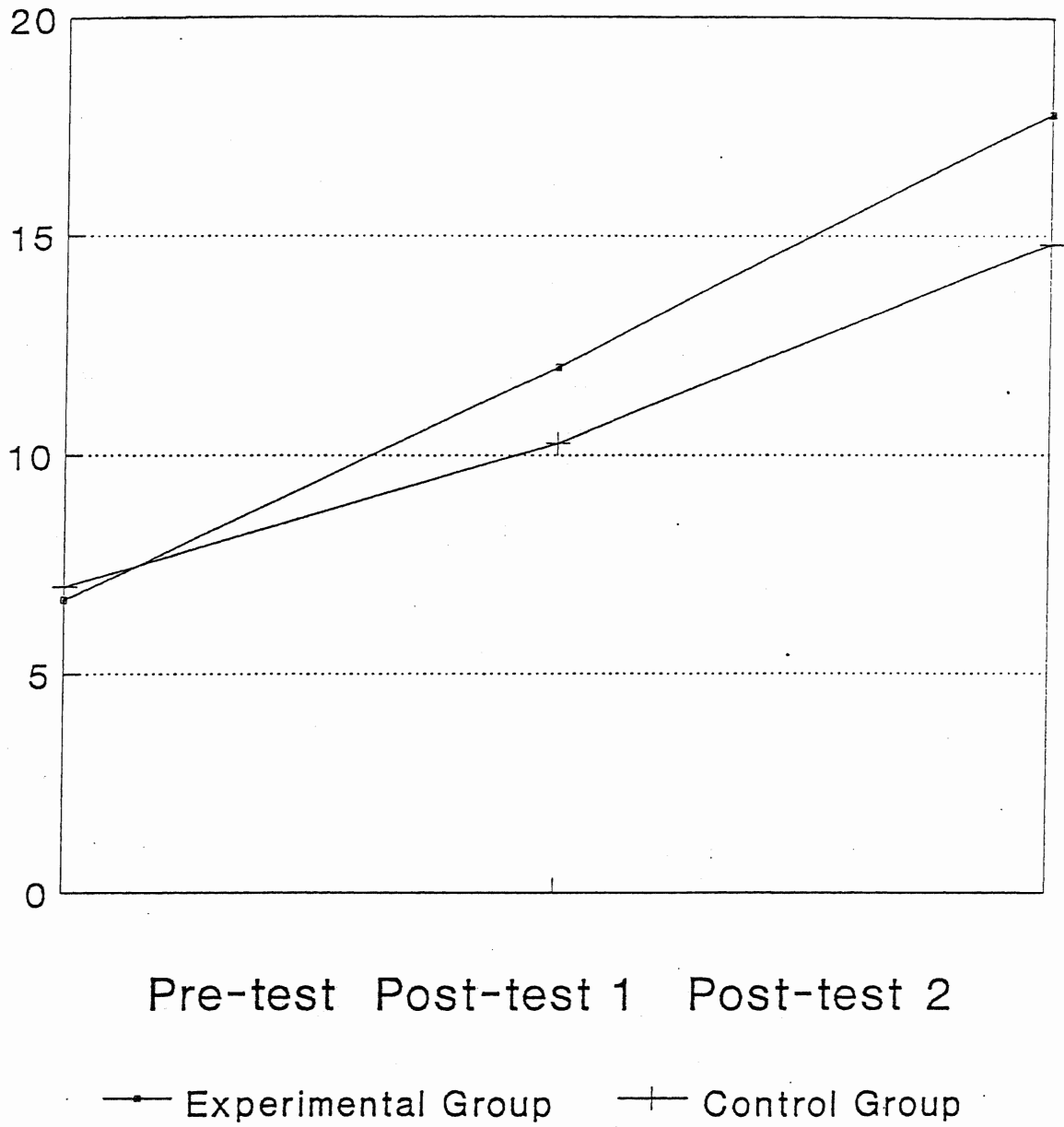


Figure 10. Mean Scores Rosner B Test.

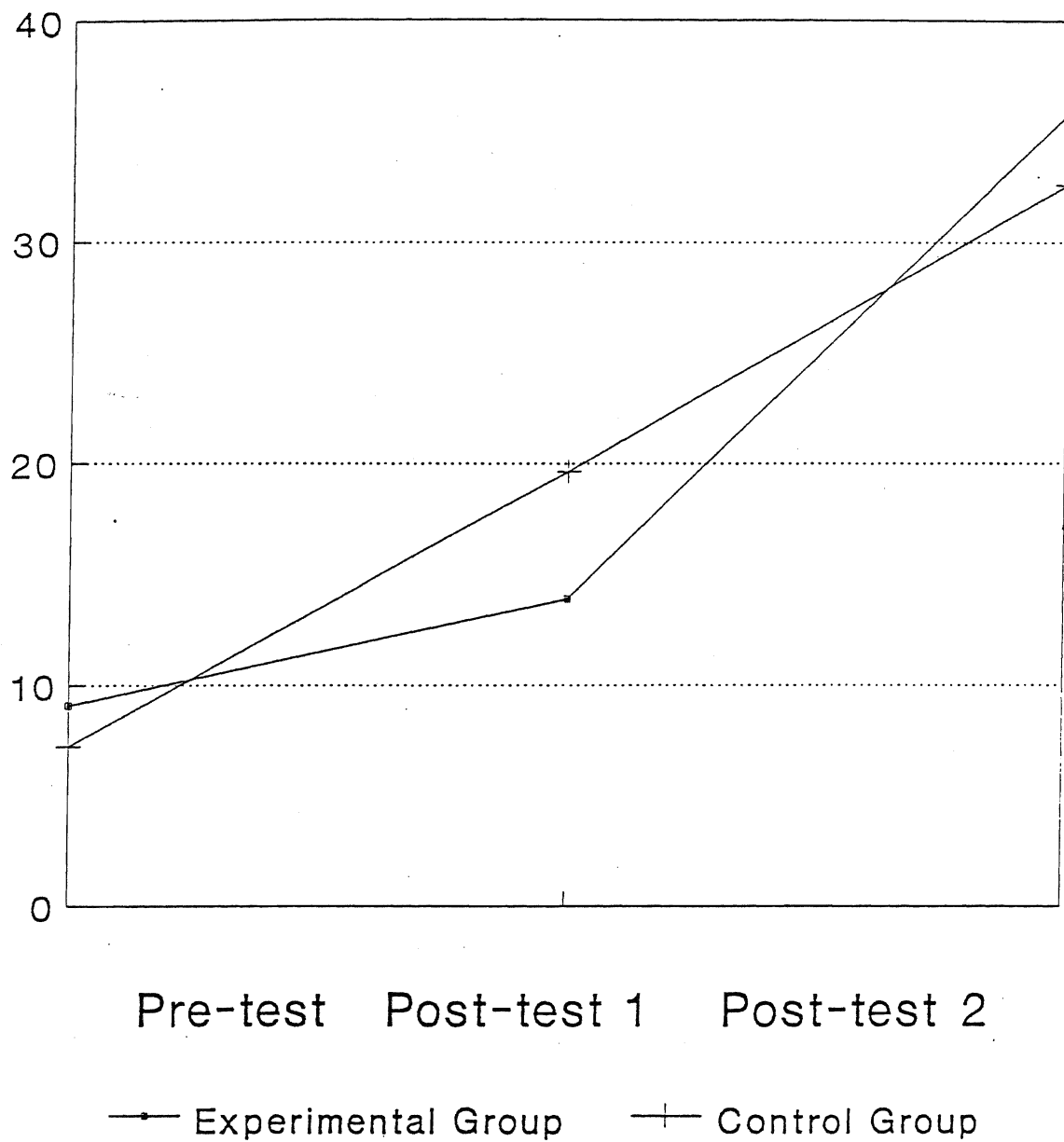


Figure 11. Mean Scores Woodcock Letter Identification Test.

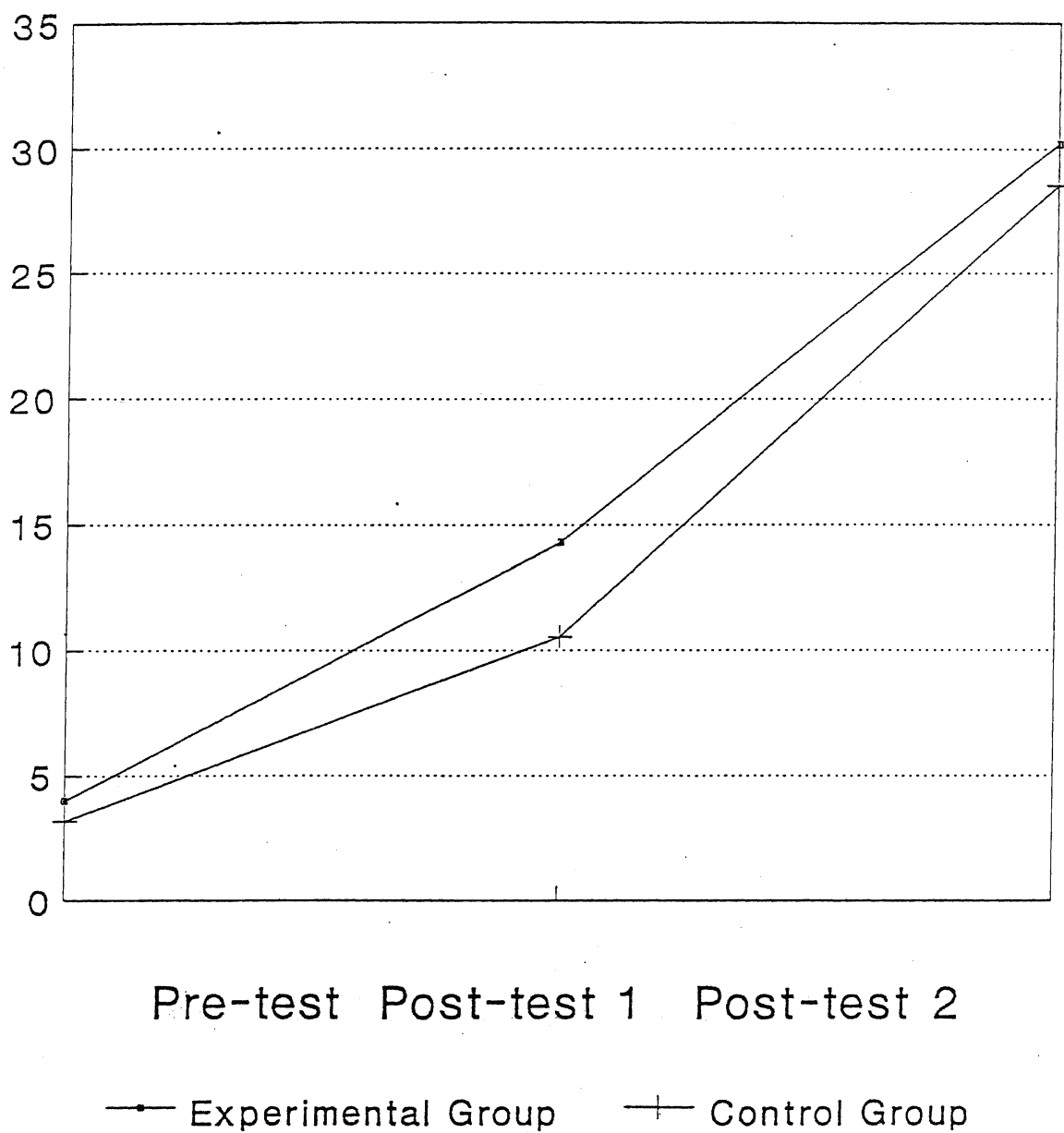


Figure 12. Mean Scores Spelling Regular Test.

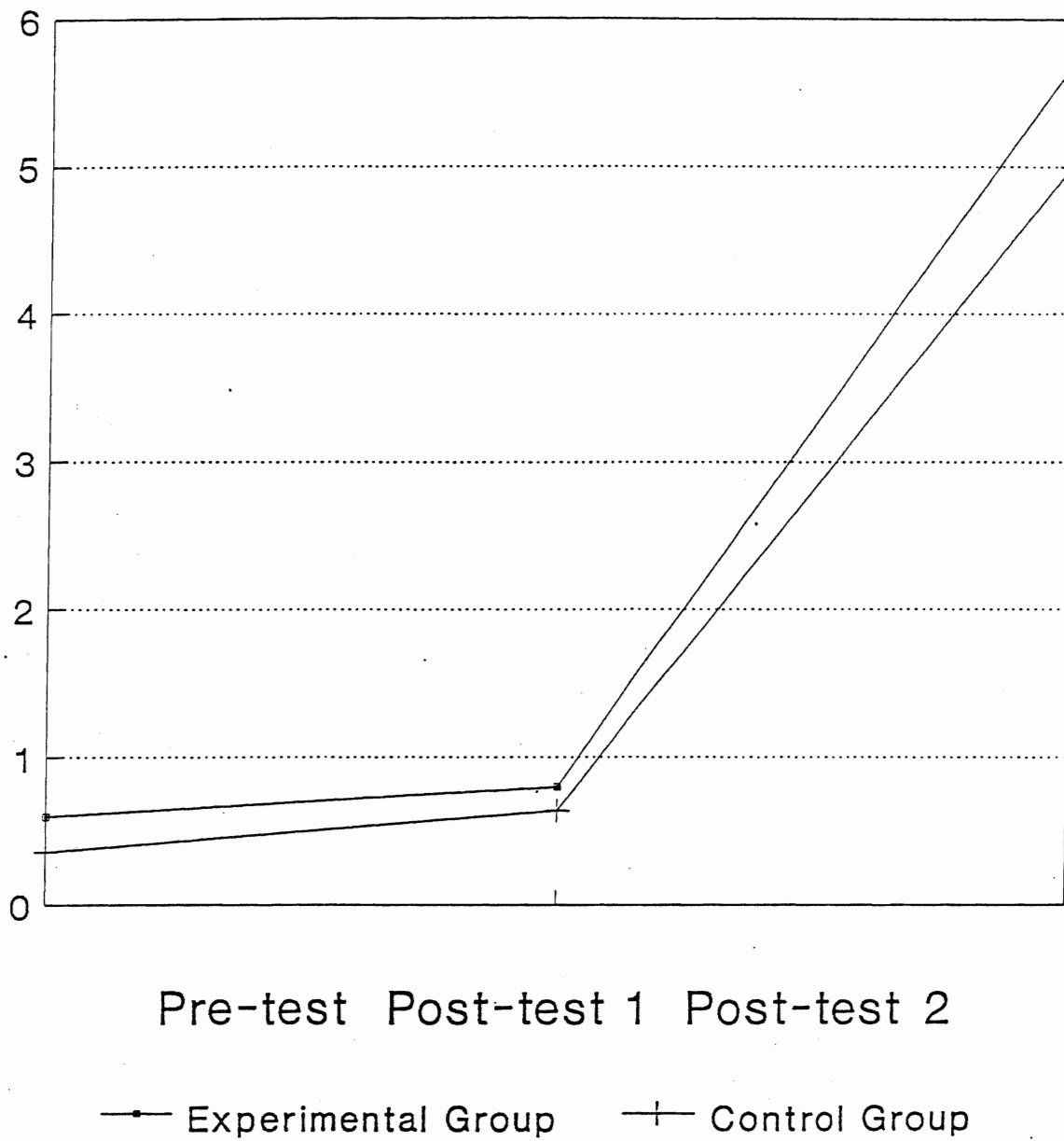


Figure 13. Mean Scores Spelling Irregular Test.

CHAPTER FIVE: CONCLUSIONS, IMPLICATIONS AND FUTURE RESEARCH

The research of this study provided some support for the global hypothesis that a five-month training program in phonological awareness would have a positive impact on the writing and reading skills of children in a Grade One class in the Lincoln County Separate School system. However, some of the specific hypotheses were not supported. In the discussion below, the three specific hypotheses will be considered in more detail. In addition, educational implications of the research and issues for future investigation will also be presented.

The data for the present study provided strong support for the hypothesis that the treatment group would progress through Read's (1971) stages of writing development more quickly than the control group. After treatment, the children in the experimental group made great improvements over time in their ability to use "real" words rather than invented spellings in written work. Since the children in the experimental group clearly used more real words by the end of the study than did the control group, it is evident that the training program enabled these children to progress through Read's stages of writing development more quickly than children without such training.

All children have a natural sensitivity to sound (Henderson, 1990). However, in order to facilitate

developmental changes in early writing, children need experiences and practice in manipulating sound patterns (Henderson, 1990). The aforementioned training program provided systematic opportunities for oral and written manipulation of sound. The program followed a developmental sequence of activities designed to nurture phonological awareness subsequently, fostering the connection between sound and print. It would appear that this conscious manipulation of sound assisted the experimental group in internalizing pattern consistencies resulting in an increase in their standard spelling repertoire (Read, 1986).

It should be noted that although the treatment group had many additional experiences manipulating and experimenting with sound, all children followed Read's developmental stages in order. Of particular interest was the very strong influence of "letter name" strategy in the children's written work. Even though "correct" sounds for the alphabet letter had been introduced in the training program, these sounds were not readily incorporated into the children's written language experiences. Rather, the children spent time in the "letter name" stage until they had internalized the sound concept introduced in the training program. This offers further support for the developmental nature of early writing as introduced by Read (1971). Perhaps children need to be in the concrete operational stage of thinking in order to understand that

letters make up the element of sound in words (Henderson, 1990). Further, perhaps the training program challenged the child's thinking enough to advance his/her level of thinking.

Significant gains in the spelling of regular words at time-two and time-three testing were noted for the children in the experimental group, while children in the control group did not demonstrate the same changes over time.

Early spelling strategies utilized by the young writer use an unsophisticated but accurate phonetic system. However, letter/sound relationships are governed by their position in a word and successful spellers acquire the knowledge of this set of positional rules (Henderson, 1990, p. 9). Good spellers know the functional position of letters (Henderson, 1990). Again, it would appear that the conscious manipulation of sounds during the training program had a positive impact upon the spelling of regular words. The training program provided opportunities for the treatment group to use their unconscious knowledge of their phonological system at a conscious level (Richgels, 1986b). Specifically, aspects of the training program required the child to consider the order of letters when producing various sound patterns. It is felt that this conscious attention to the order of sound patterns enabled the experimental children to internalize and organize information about the sound patterns in English. Only after

children have had an opportunity to internalize information can they begin to construct rules. The training program provided an opportunity for the construction of rules and it seems these rules were then applied to the spelling of regular words. Thus, it was not until the time-two and time-three testing that the differences between the groups became significant in the spelling of regular words. On the basis of these differences in group changes over time, it is evident that training in phonological awareness has a direct positive effect on the spelling of regular words for children during the early stages of writing.

However, beginning writers either spell words correctly from memory or sound them out letter by letter (Henderson, 1990, p. 89). As the data indicates, the training program did not have a significant effect on the spelling of irregular words. In fact, access to such words for the young writer would depend more upon memory than the ability to apply phonological skills. It is not surprising, then, that there was no significant difference between groups in the ability to spell irregular words.

While the results of the Lindamood during the second testing period suggest children in the experimental group improved more over time than did the control group, data for the final testing period showed no difference between subjects over time. A closer look at the data shows the experimental group reaching ceiling levels on many of the

test items during the final testing period. This could account for the fact that no significant difference appears as a result of the third testing session.

Similarly, the Rosner Test of Auditory Analysis Skills is designed to evaluate phonological awareness. However, it is best suited for children from mid-Kindergarten to mid-Grade One. Results indicate a significant difference within each group over time but no significant difference between the groups during the experimental period. Again, ceiling levels were attained on many tasks possibly because of the age and developmental stage of the children.

Keeping in mind that both the treatment group and the control group participated in a classroom writing program which encouraged an awareness of letters and sound patterns, and given the age and developmental level of the children, the gains made by both groups are not totally unexpected. All the children were encouraged to invent spellings beyond their reading and writing experience and given daily opportunity to practise and consolidate their sound system.

Although the findings of the Rosner tests did not support the impact of the training program, a close look at individual test items supports several conclusions from earlier studies. Results show the actual sequence of development in phonological awareness to be constant for the children in the target classroom. This is consistent with earlier findings by Read (1971) and Beers and Henderson

(1977). The hierarchical nature of segmentation skills was very evident in the test items on the Rosner. Children in both groups were able to successfully segment into syllables before phoneme segmentation was perfected. This would support earlier work done by Read (1971) and Liberman et al. (1974).

It would appear that the results of the Rosner Tests reflect maturational changes in the child rather than causal effects of the training program. Perhaps such a training program would be best implemented mid-Kindergarten rather than during Grade One.

It was hoped that the phonological training program investigated in the present study might be associated with gains in other aspects of language. Yet, there were no significant differences between groups during the experimental period in either vocabulary or reading skills. Several issues may have contributed to these findings. The sample size used in the present study may have been too small to support the given hypothesis. Also, the five-month period of training may have been too brief a time period to see effects that transfer significantly to other aspects of language.

Although some of the hypotheses presented were not supported by the study, the results of the present study do indicate that children during the early stages of reading and writing development can benefit from a training program

in phonological awareness.

Not only are the results theoretically interesting, they are also educationally valuable.

Since success in early writing skills is related to the degree to which the learner is aware of the underlying phonological structure of words, it seems from this study that educational programs developing phonological awareness have a legitimate place in school curriculum.

The positive results of this training program on the spelling of real words shows that there is one method for teaching beginning writing which is more suitable than another. With systematic phonological training and the experience of mapping speech to print, the young writer can become cognizant of the interactive function of sounds and letters. This experiment provides a theoretical direction for effective programming. It empirically supports the idea of training phonological awareness concurrent to beginning efforts in writing. The educational importance of this study seems clear.

However, in education there are often gaps between theory and practice. If, as educators, we hope to reduce the demands on the young writer and thereby make the task of early writing easier, then such a training program has a place in early writing curricula. The description of the systematic training program used in this experiment can be implemented in regular classroom programs and result in more

effective instructional procedures.

It can be stated that the standard spelling of many regular words need not be the result of formal instruction in spelling during the early years; rather, mastery of regular words in early writing experiences can be the direct result of a training program in phonological awareness. This research has examined how and which teaching activities increase phonological awareness. In the classroom, such a training program would include the tasks and activities outlined in the experiment, thereby providing the children with opportunities to develop phonological competence.

However, given the structure of the training program, it becomes necessary for teachers who incorporate such a program to become skilful observers with the ability to analyze the stage of each child's phonological development.

This training program can complement process writing programs already in existence in many Ontario schools today. It can develop phonological awareness to the level of automaticity so that the writing process becomes less demanding for the child. In fact, as a result of such training, the flow of written language can become fluent and uninterrupted.

It is hoped that this study will contribute to the theoretical ideas regarding phonological awareness and early writing skills and subsequently encourage primary educators to put theory into practice.

While the value of this study can have an immediate impact on classroom programming, it also raises issues for future research.

The effects of such a training program on the writing skills of high-risk children who have deficiencies in phonological awareness may provide evidence for an appropriate intervention strategy for the learning disabled. Also, research on the effects of such a study on the adult population of illiterates is yet needed.

Of greatest interest to the author of this study is a longitudinal examination of the success of the experimental and control groups of the current study in the junior grades.

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Appendix A. Letter of Permission

PLEASE RETURN THIS PORTION TO THE SCHOOL AS SOON AS POSSIBLE.

I _____ (Name of parent/guardian) give permission to have _____ (Name of child) participate in the study that Chris Graham is conducting for her Master of Education thesis at Brock University. I understand that my child will be assigned a number on the different test forms and that confidentiality is assured. I understand that the results will be discussed only in terms of the entire group of children in the thesis and at no time will an individual's results or identity be made available to the school, but will be shared with me upon request.

(Signature of parent/guardian)

I _____ (Name of parent/guardian) do not wish to have _____ (Name of child) participate in the study of children's early writing.

(Signature of parent/guardian)

Appendix B. Letter Describing Study

Dear Parent/Guardian,

I am writing this letter to request your permission to have your child participate in a study I am conducting for my Master of Education thesis at Brock University.

The aim of the study is to determine the types of activities which influence children's early writing skills.

Each child participating in the study will be involved in four testing sessions of approximately twenty minutes each. One of the tests is The Woodcock Reading Mastery Test which will look at pre-reading ability and letter identification skills. The second test is the Peabody Picture Vocabulary Test; it requires the child to point to the picture that most appropriately describes a given word. The Rosner Test of Auditory Analysis and The Lindamood Auditory Conceptualization Test will ask the child to code a given sound pattern in a given word using coloured blocks. The final test, the WRAT, will evaluate very early spelling skills. The tests will be individually administered by a tester familiar to the children and will take place at our school. Each child's scores will be kept confidential. They will not be released to the school or any other party.

Following the initial testing, the children selected for the study will participate in activities which are thought to help develop early writing skills. The children will be involved in these activities three or four days a week for approximately twenty minutes a day.

Upon completion of the thesis, I will share the overall results of the study with the school.

I have received permission from Mr. M. Wilcox and the school board to conduct my study at our school. I sincerely hope that you will cooperate in this as well. If you have any questions please do not hesitate to call me at the school at (416) 934-9972. Please complete the attached consent form and return it to the school with your child.

Sincerely,

Mrs. Chris Graham.