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ABSTRACT

The study involving 36 learning disabled elementary students investigated a data based model of remedial phonics instruction which incorporated such principles as providing focus, teaching for mastery, distributing practice, training for discrimination, and emphasizing strategies for transfer. Ss, drawn from special education classes or clinics, were taught for nine 30 minute periods over 3 weeks. Posttest performances indicated that these children were able to learn over 75% of the words taught, to apply the vowel sounds taught to over 60% of the novel words presented, and to read 60% of the training and transfer words presented within the context of sentences. Results confirmed the importance of the application of learning principles to phonics instruction for a disabled population. (Author/SB)

RESEARCH INSTITUTE FOR THE STUDY OF LEARNING DISABILITIES
Teachers College, Columbia University

"LD EFFICIENT" INSTRUCTION IN PHONICS: APPLYING SOUND LEARNING PRINCIPLES TO REMEDIAL TEACHING

N. Dale Bryant, Harriet R. Fayne, and Maribeth Gettinger

Addendum:

Field Replication: "LD Efficient" Phonics Procedures

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Abstract

This article describes a data-based model of remedial phonics instruction for learning disabled youngsters. "LD efficient" phonics procedures incorporate important principles such as providing focus, teaching for mastery, distributing practice, training for discrimination and emphasizing strategies for transfer. Thirty-six learning disabled, elementary school children, drawn from special educatior classes or clinics, were taught for nine, 30-minute periods over three weeks. Posttest performance indicated that these children were able to learn over 75% of the words taught, to apply the vowel sounds taught to over 60% of the novel words presented and to read 69% of the training and transfer words presented within the context of sentences. Results of the present study confirm the importance of the application of learning principles to phonics instruction for a disabled population.

"LD Efficient" Instruction in Phonics: Applying Sound Learning Principles to Remedial Teaching

The failure of LD children in general classroom instruction may be due, in part, to the nature of that instruction. While many non-handicapped children may be able to achieve even when instruction is complex, incomplete, or overwhelming, LD children can become easily overloaded or confused by techniques or materials which are less than optimal. In an attempt to design instruction which is both effective and time-efficient, the authors have developed a sample intervention in phonics which incorporates specific learning principles. While these principles are often cited in textbooks and professional articles (see Bryant, 1965; Haring & Bateman, 1977; Otto, McMenemy, & Smith, 1973), they are not always operationalized in current remedial teaching practices.

Five major principles are outlined in this section: providing focus, giving sufficient practice so that a level of mastery is reached, allowing time for distributed practice and review, insuring discrimination of learned material from other material, and training for appropriate transfer of skills to new contexts.

Providing Focus

It is common practice to present phonic elements in a "discovery" format. Manuals for published reading materials often give linguistic justifications for activities which require children to infer specific sounds embedded in words or to make generalizations from a series of exemplars. While non-handicapped children may be able to make such

inferences, LD children, because of difficulties attending selectively to critical and central task information (Ross, 1976), will not necessarily make exact or accurate associations.

Three important techniques can potentially facilitate selective perception of critical stimuli. First and foremost, teachers need to inform children of what they are expected to learn. A second technique involves the use of prompts. Prompts are cues which focus learners and direct them to correct responses. The effectiveness of prompting has been documented (Angell & Lumsdaine, 1961; Cook & Kendler, 1956). A third technique involves providing correct models for responses as well as giving informative feedback concerning the accuracy of responses (Travers, Van Wegenen, Haygood, & McCormick, 1964).

Giving Sufficient Practice: An Emphasis on Mastery

Bloom (1968) proposed that nearly all children can reach a criterion of mastery on basic skills if provided with adequate instructional time and effective teaching procedures. According to Block (1971), mastery learning procedures share many features: specification of instructional objectives, well-defined learning tasks, mastery of specific steps in a skills hierarchy; criterion-referenced evaluation of performance; and provisions for repeated instruction for individuals who need additional practice to achieve mastery. Many research studies have demonstrated superior achievement for students trained with mastery learning procedures (e.g., Katims, 1977; Kim, 1975), even if students had below average achievement, motivation, or intelligence (Block, 1971; Bloom, 1973, Carroll, 1963; Lawler, Dick, & Riser, 1974; Suppes, 1964).

Distributed Practice and Review

Experts in the field of remedial education agree that sufficient practice is necessary to reach the goal of mastery (e.g., Bryant, 1965; Haring & Bateman, 1977; Otto, McMenemy, & Smith, 1973). However, in order for practice to be effective for disabled youngsters, it should be spaced across various practice sessions with breaks built into the schedule. Children who demonstrate inadequate reading skills seem to be particularly susceptible to the effects of fatigue and interference during instruction (Otto & Fredericks, 1963). Distributed practice can help to circumvent these fatigue and/or interference problems.

Once learned, associations between symbols and sounds or printed words and their speech counterparts need to be reviewed. When learned associations are stored but not used, retrieval becomes troublesome. Systematic review strengthens skill acquisition and helps to make LD children more automatic with necessary basic skills (Bryant, 1965).

Discrimination Training

LD children need to process perceptual units in a precise fashion. The literature on reading and learning disabilities indicates that many underachieving youngsters display deficiencies in the discrimination of language-related auditory and visual stimuli (e.g., Doehring, 1968; Flynn & Byrne, 1970; Hook & Johnson, 1977). Because LD children evidence discrimination difficulties, Frostig and Maslow (1973) believe that similarities and differences must be clarified and emphasized. Unique features of specific elements should be stressed in instruction (Bryant, 1965; Otto, McMenemy, & Smith, 1973).

Training for Transfer

The goal of phonics instruction is, of necessity, the application of learned elements to new words and to word reading in context. Poor readers do not appear to utilize efficient strategies when asked to read novel words. They demonstrate a marked deficiency in their ability to group or cluster letters into common orthographic patterns (Calfee, Venezky, & Chapman, Note 1; Golinkoff, 1974; Vellutino, Steger, & Kandel, 1972). It seems prudent to provide disabled learners with a strategy which helps to make learned information useful in a variety of contexts.

Stern and Gould (1965) argued that within monosyllabic words, an attack strategy which encourages the child to break words into /initial consonant plus vowel/ and /final consonant/ utilizes the "natural parts" of words (e.g., ma-n). Fayne (1979) found that such a strategy taught to LD youngsters yielded better transfer to novel words than did strategies which used either final phonograms (c-ot) or letter-by-letter (l-o-g). This initial unit strategy appears to be differentially effective because it both emphasizes left-to-right processing and reduces the number of units to be blended.

In addition to an effective word attack strategy, LD children need practice in applying skills within the context of connected prose. The literature on transfer indicates that skill utilization is a function of the degree of variation in the original training (Duncan, 1958; Restle, 1958). Instruction should incorporate opportunities for children to utilize skills within a sentence context to ensure positive transfer to text reading.

The present study evaluates the performance of LD children under instruction which incorporates the principles described above. Within a practical time framework, can LD youngsters learn, retain, integrate, and apply specific phonic elements? "LD efficient' lessons were given to LD children deemed to have inadequate word attack skills. The instructional sequence taught: (1) letter-sound associations for two dipthongs; (2) application of these associations to word reading; (3) utilization of a specific word attack strategy for decoding novel items containing these dipthongs; and, (4) maintenance of accurate word reading within sentences. This article describes the "LD efficient" instructional approach in phonics and presents data to support its effectiveness.

Method

Subjects

A total of 36 children (30 boys and 6 girls) were selected from populations of elementary school children enrolled in diagnostic-remedial classes in the New York City public schools or in remedial reading classes conducted at two psychoeducational clinics in New York City. All children had been classified as learning disabled by school or clinic personnel. The school district and clinic evaluation teams used the following criteria to classify youngsters: (1) at least a two-year discrepancy between academic achievement and intellectual functioning, and (2) no indication of primary sensory, intellectual, emotional, or neurological deficits.

Teachers or clinicians selected children whom they felt could profit from phonics instruction. On a word-reading task, administered prior to instruction, these children demonstrated an inability to decode words containing the two dipthongs to be taught.

The sample had a mean chronological age of 120 months (SD = 19; range = 86-162), a mean Full Scale IQ (Wechsler Intelligence Scale for Children-Revised) of 87.3 (SD = 10.0; range = 70-119), and a mean word recognition grade equivalent score (Wide Range Achievement Test) of 1.9 (SD = 0.7; range = K.5-3.8). Children were drawn from populations that represented predominantly lower socio-economic levels and black or hispanic ethnic backgrounds.

Procedure

The instructional procedures used were designed with the intent of optimizing the learning of decoding elements for the learning disabled sample by incorporating the instructional principles described in the introduction of this paper. Lessons were constructed to provide all children with an opportunity to achieve mastery of: (a) producing the sound of two vowel digraphs - ou and oo; (b) reading lists of single-syllable words and nonsense syllables containing the digraphs; (c) applying a blending strategy to new words; and, (d) reading sentences which included words containing the digraphs.

All children received nine, 30-minute periods of instruction over nine days. The children were taught in groups of two to five on three different days each week for three consecutive weeks. The lessons

were conducted by six experimental teachers who were graduate students in special education or reading. All teachers received training which included careful reading of lesson scripts, familiarization with teaching materials, and simulated activities for each part of the lessons. In addition, each teacher was observed during an instructional period to insure that procedures were carried out according to the prescribed scripts.

Summary of lesson format. Instruction for week one and week two were identical, except that a different vowel digraph was taught each week. The order of presentation for specific elements was counterbalanced across instructional groups. In the first lesson, children received introductory activities which focused on one specific sound-symbol association. Mastery of the symbol-sound association was defined as reaching criterion (one correct trial) on each of the following subskills: production of the sound in isolation; production of the sound when it is presented within words containing the element; and rejection of words which do not contain the element. After reaching criterion on these subskills, the children were given directed instruction on a blending strategy with an exemplar containing the first pattern[1] to be taught (e.g., pou-nd).

Children then were given mastery (or criterion-referenced) practice on two training words and two nonsense syllables following the first pattern. In addition, two nonsense words which did not have the specific element (i.e., oo or ou) were included for discrimination practice. The components of mastery practice were essentially

[1]"Pattern" is defined as the initial consonant plus vowel digraph.

the same across all days of instruction: Children read ou or oo words from individual practice sheets while the teacher recorded the number of trials needed by each child to reach criterion on all items on a separate recording sheet. Whenever a child made an error, the teacher recorded an incorrect trial and modeled the blending strategy for the child by breaking up the word into the two components; the child immediately repeated the parts and blended them. Children were instructed to reject (i.e., "say no") the two words that did not contain the training element. All pupils were able to reach criterion (i.e., one correct trial per word) within five trials. Only those words on which errors were made were recycled for children until each was mastered. Once an item was correct, it was dropped from that particular child's list. Children in a group who reached criterion on all items within a minimum number of trials remained actively involved in the lesson through choral responding (after an individual read a word correctly) and self-recording on practice lists. This same instruction--demonstration of the blending strategy followed by mastery practice--was given in the first lesson for three additional patterns (e.g., sou, bou, fou).

The second lesson in weeks one and two began with a review of the four patterns and training words (two per pattern). This review was followed by mastery practice on two lists containing the training words and nonsense syllables of all four patterns intermixed. Ten non-patterned, nonsense syllables containing the dipthongs were then practiced in game format. In lesson three, the week's eight training

words were reviewed and children applied the training words to the reading of simple sentences.

Instruction during the third week focused on the integration of ou and oo words. During the first lesson children received mastery practice on the eight ou words separately and on the oo training words separately. Lesson two began with individual practice in discriminating and reading words that were identical except for the medial vowel digraph (e.g., pooch and pouch). Children then were given mastery practice on two lists of intermixed training ou and oo words. The final lesson included sentence-reading practice with training words as well as practice on non-patterned ou and oo nonsense syllables presented in game format.

Materials. The eight training words for each sound were selected to meet two criteria: they could be grouped in pairs by pattern, and they were not likely to be in a child's sight word repertoire. Three consonant combinations (th, nd, ch) occurred at the end of eight of the sixteen training words. Twenty-four patterned nonsense syllables (six for each pattern) were also used during training. In addition, ten non-patterned, nonsense syllables for each sound were used for game practice. Specific training words as well as nonsense syllables used during training are shown in Table 1.

Table 1

Training Words and Examples of Nonsense Syllables Used During Instruction

ou			oo		
Training Words	Nonsense Syllables	Non-Patterned Nonsense Syllables	Training Words	Nonsense Syllables	Non-Patterned Nonsense Syllables
pouch	poug	toup	tooth	tood	foop
pout	pouz	louv	tool	toog	goot
south	soub	noub	booth	bool	loog
sound	souv	cout	boom	boop	roos
found	foug	joug	mooch	moov	moof
foul	fouk	gous	mood	mooz	jook
bound	bouk	houd	pooch	poob	zoob
bout	boun	zoum	pool	poov	loov

Measurement. An individually-administered test was given one day prior to training as a pretest and one day after training as a posttest. It consisted of the 16 training words, 12 non-patterned words containing ou or oo, and 16 nonsense syllables. Nine of these transfer items ended in ch, th, or nd.

Children were also tested at the end of week one and two on their ability to read the eight training words, six real words, and eight patterned nonsense syllables.

In order to assess a child's learning rate on the material presented in the lessons, the number of trials needed to reach criterion on items was tabulated. This learning rate measure (initial learning trials score) was computed by summing the number of attempts needed to make an accurate response on the sixteen training words across four days of instruction. A retention measure (retention trials score) was computed by summing the number of trials needed to read all training words correctly on the first day of instruction during week three.

Results

The means and standard deviations for pretest, weekly test, and posttest performance are presented in Table 2. On the average, children read 78% of the sixteen training words correctly on the weekly tests and posttest. The accuracy with which children read whole transfer words (real and nonsense) on the weekly tests and posttest ranged from 45% to 54%. In addition, children, on the average, were able to produce the ou and oo sounds correctly in the context of transfer

items 68% of the time on the weekly tests and 64% of the time on the posttest.

Table 2

Means, Standard Deviations, and Obtained F Values for Pretest, Weekly Test and Posttest Performance on Training Words, Transfer Words, and Sounds in Transfer Words

Score	Possible Range	Pretest	Weekly Test	Posttest	F
Training Words	0-16	2.61 (3.03)	12.47 (3.51)	12.36 (3.04)	280.72*
Real Transfer Words	0-12	2.36 (2.38)	6.50 (3.30)	6.25 (3.11)	52.69*
Nonsense Words	0-16	0.64 (1.25)	8.28 (3.69)	7.25 (3.98)	105.62*
Sounds in Transfer Words	0-28	4.18 (3.96)	19.15 (5.28)	17.94 (5.73)	189.29*

Note. N = 36.

*p < .001.

Four separate repeated measures analyses of variance were performed for each score on the pretest, weekly tests and posttest. The analyses on the number of correct training words, transfer words, nonsense syllables, and sounds in transfer words yielded significant effects at $p < .001$. Post hoc comparisons among test means, using Sceffé contrasts, revealed that performance in all four areas was significantly higher on both the weekly tests and posttest than on the pretest. Differences between weekly test and posttest performance, however, were non-significant. Thus, children made significant gains after a week of instruction in one phonic element. In addition, these gains were maintained by the end of three weeks of instruction, during which two phonic elements were taught and integrated.

Comparisons were also made, using t tests for dependent groups, on the average number of words read correctly in the context of sentences and on the average number of consonant combinations produced correctly in transfer words from pretest to posttest. The results of these comparisons are shown in Table 3. The group read, on the average, 69% of the twelve words correctly in sentences on the posttest. This was significantly higher than pretest performance, t (35) = 10.50, $p < .001$, indicating that, after three weeks, children were able to apply their decoding skills to sentence reading. In addition, approximately 71% of the consonant combinations occurring at the end of transfer words were produced accurately. Again, this was a significant gain from the pretest, t (35) = 10.18, $p < .001$.

Although the children did not receive direct instruction on the three final consonant combinations (ch, th, nd), which occurred at the end of half of the training words, these results suggest that children learned these combinations incidentally and were able to apply them to other non-training words.

Table 3

Pretest to Posttest Performance on Number of Words Read Correctly in Sentences and Number of Consonant Combinations Produced Correctly in Transfer Words

Measures	Possible Range	Pretest	Posttest	Gains
Words in Sentences	0-12	3.32 (3.15)	8.30 (2.78)	4.98*
Consonant Combinations in Transfer Words	0-9	2.31 (2.67)	6.38 (2.44)	4.07*

Note. N = 36.

*Gains are significant at the .001 level.

The average number of initial learning trials (number of attempts needed to read the sixteen training words correctly summed over two days of instruction) for the group was 42.9 (SD = 9.4). Children were divided into three groups (high, average, and low trials group) on the basis of their initial learning trials scores. Fourteen children with trials scores within ½ SD above or below the group mean were included in the "average" trials group. Those children with trials scores greater than ½ SD above the mean were in the "high" trials group (n = 10), and, children with scores more than ½ SD below the mean were in the "low" trials group (n = 12). The means and standard deviations of posttest performance (total correct sounds and words) and retention trials scores (number of attempts needed to read all sixteen training words correctly on the first day of instruction during Week Three) for the high, average, and low trials groups are presented in Table 4.

Table 4

Posttest Performance and Retention Trials Scores for Groups with High, Average, and Low Initial Learning Trials Scores

Group	N	Range in Initial Trials	Measures		
			Correct Sounds	Correct Words	Retention Trials
High Trials	10	48-73	29.00	19.44	28.22
			(8.72)	(9.59)	(4.62)
Medium Trials	14	38-46	30.92	25.97	19.38
			(6.60)	(8.04)	(3.75)
Low Trials	12	33-37	35.08	30.08	18.33
			(6.95)	(6.76)	(2.31)
TOTAL	36	33-73	31.88	25.63	21.85
			(7.53)	(8.87)	(4.57)

An analysis of variance for the total number of sounds produced correctly in the context of the 44 posttest items (training words, real, and nonsense words) indicated that the three groups did not differ significantly in their ability to learn and transfer the phonic elements taught to other words. However, an analysis of variance did yield significant differences among the three groups with respect to the number of whole words (out of 44) read correctly on the posttest, F (2,33) = 5.02, $p < .05$, and the retention trials scores, F (2,33) = 7.92, $p < .01$. Post hoc comparisons, using Scheffé contrasts, showed significant differences on both measures between the low group and both the average and high groups; differences between the average and high groups, however, were not significant. Thus, all children, regardless of their initial learning rate, were able to learn and transfer the sound of the phonic elements taught. However, children with poor initial learning rates experienced less success in whole word reading on the posttest and evidenced poorer retention on the training words at the start of the third week of instruction.

Discussion

The present investigation provides empirical support for systematic teaching which incorporates sound learning principles. Learning disabled children, who demonstrated limited knowledge of medial vowel combinations prior to instruction, were able to learn over 75% of the ou and oo words taught, to apply the two vowel combinations to over 60% of the novel, nonsense, and real words presented, and to read 69% of the training and transfer words tested within the context of sentences after nine sessions of "LD efficient" instruction. In addition, children were able to produce 71% of the consonant combinations occurring at the end of transfer words. Although direct instruction was not provided on consonant digraphs, children had repeated practice on them in the context of training words. Thus, the lessons were successful in teaching application of the vowels in a direct manner and application of consonant combinations in an indirect manner.

It was possible to characterize low or average achieving pupils according to their rate of initial learning. Those pupils who needed an average of two or more trials to read each training word correctly in initial instruction demonstrated inadequate retention of these words over time and less than 50% accuracy with words on the posttest. On the other hand, children who read training words accurately in one trial, on the average, retained these words over time and attained a level of at least 60% accuracy with words on the posttest. Therefore, the time needed to reach criterion

on words in initial instruction may well predict retention and application of learned material.

Further research is needed on the relationship between certain basic skills or processing capabilities and the ability to profit from this phonics instruction. In addition to a measure of initial learning rate, there are measures that tap other processing deficiencies in learning disabled children that may also serve as useful predictors of posttest performance. For example, correlational research that examines the relationship between inadequate auditory memory, inability to blend phonic elements into words, or inconsistent knowledge of consonant sounds to overall achievement may help to differentiate those children who are not able to achieve greater 50% accuracy on the posttest.

The results of the present study confirm the importance of the application of learning principles to phonics instruction for learning disabled youngsters. All children in the sample made gains as a result of systematic instruction that provided focus, emphasized mastery, provided distributed practice and review, included discrimination training, and trained for transfer. It is important to note that, regardless of initial learning time, children in the sample were able to produce the medial vowel sounds in the context of words with 65% or better accuracy on the posttest. Thus, the primary instructional objective of teaching the application of two vowel combinations was reached for all children. Although further research is needed to clarify the relationship between individual learner characteristics

and achievement in phonics, the importance of these principles should not be minimized when designing phonics instruction and learning materials for learning disabled children.

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Field Replication: "LD Efficient" Phonics Procedure

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Field Replication: "LD Efficient" Phonics Procedures

A major product of the Reading and Spelling Task Force during Years 1-3 was a set of procedures designed to teach LD youngsters letter-sound associations and the application of these associations to word reading. Procedures were refined through a series of studies which tested the effectiveness of specific aspects of the instructional model (e.g., the amount of focus needed to teach a symbol-sound association, the transfer value of various blending strategies, and the relative efficacy of various integration and review activities). Techniques which proved to be effective were incorporated into a three-week instructional unit which introduced two phonic elements and provided practice in the discrimination and application of these elements within the context of words and sentences. Two different packets were created, one which focused on two "short" vowels (e and i), and the other which focused on two vowel combinations (ou and oo). With the exception of the specific elements and words taught, the two packets were identical. A complete description as well as data supporting the effectiveness of the procedures can be found in the manuscript entitled, "LD Efficient Instruction in Phonics: Applying Sound Learning Principles to Remedial Teaching."

Findings from the study described in the manuscript indicated that children taught by Institute staff members with these lessons made significant gains in their ability to apply specific phonic elements

when reading single words or sentences. The next step in the Task Force research plan was to test out the effectiveness of these lesson packets when teachers in the field used them in their classrooms.

During the winter of 1980, New York City Learning Disabilities Resource Room teachers participated in workshops designed to introduce "LD Efficient" principles and procedures. The workshop leaders, Drs. Gettinger and Fayne, covered "LD Efficient" principles using a lecture format. After this large group session, teachers were divided into smaller groups and introduced to the actual teaching packets. Training with the phonics curricula consisted of a videotaped presentation of the lessons as well as simulated practice with teaching procedures, recording of trials to criterion, and test administration.

Copies of either the short vowel packet or the vowel combination packet were distributed to approximately 50 teachers. Teachers were asked to use them in the spring with small groups of LD youngsters who needed remediation in the application of specific phonic elements to word reading. Unfortunately, only eight teachers were able to send back performance data on the short vowel packet and ten teachers on the vowel combination packet. While the rest of the teachers made positive comments about the curricula, they were unable to fit the three week teaching sequence into their schedules. Many indicated that they planned to use the lessons during the next academic year.

Subjects. Youngsters were selected by Resource Room teachers to participate in the small group instruction. Thirty LD children (10 female, 20 male) with a mean age of 8.6 years (SD=2.2) received instruction with the short vowel packet. Forty-one children (9 female, 32 male), with a mean age of 9.3 years (SD=1.3) received instruction with the vowel combination packet. While actual WISC Full Scale IQ scores were available on only 20 children ($\bar{x}$=100.8, SD=13.2), all children had been classified in either low average, average, or high average range by school psychologists. The sample consisted of approximately 20% Caucasian and 80% Black or Hispanic youngsters, largely drawn from lower socio-economic school populations.

Procedures. Teachers were asked to follow the prepared scripts closely and to record trials to criterion on a daily basis. In addition, they were asked to return copies of all test protocols so that Institute staff could confirm the progress made by each student. Copies of the actual packets have been submitted to ERIC (numbers not yet assigned).

Results. Tables 1 gives means and standard deviations for pretest, weekly test, and posttest performance for the 41 youngsters instructed with the vowel combination packet and the 30 youngsters instructed with the short vowel packet. On the average, children learned over 93% of the 16 training words taught by the end of the three week unit. In addition, children were able to read over 75% of either real or nonsense words which contained learned phonic elements.

Children exhibited even a higher degree of accuracy on the specific sounds within the context of transfer words (accuracy with the sounds ranged from 82-88%).

Table 2 gives pretest and posttest performance on the average number of words read correctly in the context of sentences and on the average number of consonant combinations produced correctly in transfer words. While both groups were able to read approximately 47% of the words in sentences on the pretest, they were achieving over 80% accuracy on posttests. There was also a marked gain in accuracy on consonant combinations. While children did not receive direct instruction on the three final consonant combinations which occurred at the end of half of the training words, the fact that average gains of 37% were made on these endings attached to transfer words suggests that both groups were able to learn to apply these combinations with greater consistency as a result of exposure to the structure implicit in the choice of training items.

Table 3 presents means and standard deviations on initial learning and retention trials. Both groups appeared to learn the training items in approximately one trial per word and to retain these words over time.

Discussion. Results of the field replication corroborate the findings of the earlier investigation carried out by the Institute staff members. It appears that practitioners can use lesson packets with a high degree of success. On the average, youngsters were able to learn the material with relative ease, as demonstrated by their initial learning

trials, and to retain what they learned. More importantly, children taught with either packet were able to incorporate two potentially confusable phonic elements to be learned in novel words in isolation and in the context of sentences. It is encouraging that: 1) performance under both packets was consistently good; and 2) performance under the field conditions paralleled that reported under close experimenter supervision. Results of the field replication underline the importance of the instructional principles incorporated in the packets and serve to confirm the usefulness of the "LD Efficient" techniques.

Table 1

Means and Standard Deviations for Pretest, Weekly Test, and Posttest Performance on Training Words, Transfer Words and Sounds in Transfer Words

Variable	Possible Range	ou and oo Packet a			e and i Packet b		
		Pretest	Weekly Test	Posttest	Pretest	Weekly Test	Posttest
Training Words	0-16	5.54 (2.97)	14.90 (1.74)	15.00 (1.64)	6.17 (3.79)	13.90 (2,32)	15.03 (1.59)
Trial Transfer Words	0-12	4.51 (2.83)	10.44 (1.99)	10.24 (1.96)	4.97 (2.91)	9.03 (2.58)	9.17 (2.90)
Nonsense Transfer Words	0-16	2.27 (2.26)	13.12 (2.70)	12.90 (3.37)	3.43 (3.18)	11.10 (3.64)	12.17 (3.86)
Sounds in Transfer Words	0-28	9.02 (5.57)	25.46 (3.62)	24.59 (4.28)	12.77 (5.79)	23.23 (4.40)	23.03 (5.00)

Note: Numbers in parentheses are standard deviations.

a n=41
b n=30

Table 2

Pretest and Posttest Performance on Words Read Correctly in Sentences and Consonant Combinations Produced Correctly in Transfer Words

Variable	Possible Range	ou and oo Packet a		e and i Packet b	
		Pretest	Posttest	Pretest	Posttest
Words in Sentences	0-12	5.75 (3.72)	10.13 (1.84)	5.73 (3.50)	10.07 (1.84)
Consonant Combinations In Transfer Words	0-9	5.34 (2.49)	8.68 (.57)	4.70 (2.63)	8.03 (1.40)

Note: Numbers in parentheses are standard deviations.

n=41
n=30

Table 3

Means and Standard Deviations on Trials to Criterion

Packet	Initial Learning Trials a (Range: 32-160)	Retention Trials b (Range: 16-80)
ou and oo	37.07 (4.75)	17.68 (1.90)
e and i	39.91 (7.37)	17.21 (1.54)

Note: Numbers in parentheses are standard deviations.

a Initial learning trials were calculated on the basis of attempts needed to read the 16 training words accurately on Days 1 and 2 of Weeks 1 and 2.

b Retention trials were calculated on the basis of attempts needed to read the 16 training words accurately prior to review at the beginning of week 3.