The Effect of Direct Instruction and prior Phonological Awareness Training on the Development of Reading Skills in First Grade

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In first grade the primary mission is to teach children to read. Over the last four decades considerable effort has gone into assessing beginning reading and how to optimize children's acquisition of early literacy skills. It is now well known that children who start out as proficient readers tend to be more successful in school. Children who are poor readers are frequently at risk for more academic and behavior problems and may ultimately find schooling so discouraging that they drop out.

Studies sponsored by the National Institute of Child Health and Human Development indicate that 44% of white students in fourth grade had reading skills so poor that they could not read to learn. The percentages were eve0.2

Horizons Fast Track A-B was field-tested (Englemann 1999) between 1992 and 1998 and revised four times based on detailed instructor notes and daily performance assessment of students.

basal reading programs. Instruction in Horizons Fast Track A-B was expected to positively influence several aspects of reading skill acquisition including the following: nonsense word

One Horizons Fast Track A-B class had been given intense training in phonological awareness by

Students were tested individually with a nonsense word probe followed by an oral reading fluency probe. This took two minutes per child.

Progress monitoring sessions were scheduled every other week from Late September until late May. Eight phonological segmentation fluency probes were used, twice a month for four months. Ten oral reading fluency probes were used in five months. Missed probe sessions due to illness or other factors were not rescheduled. Before beginning each progress monitoring session the experimenter told the students that they would be asked to say the sounds in various words, read some nonsense words, or read aloud, starting on the top of the page. The experimenter read the directions for the phonological segmentation fluency task. " I am going to say a word. After I say it, you tell me all the sounds in the word. So, if I say, 'Sam' you would say /s/a/m/." The phonological segmentation fluency sheets were randomly selected from the set of 20 probes. The datum was the number of phonemes isolated.

Next the student was given a randomly sheet with 85 nonsense words on it asked to read make believe words and told "You can say the sounds of the letters or you can say the whole word." The datum was the number of letter sounds correctly identified. Finally, students were given a randomly selected reading passage which was not derived from the curriculum students were using. The experimenter marked reading errors on the corresponding scoring sheets. Separate scoring sheets were used for each student. At the end of one minute the experimenter stopped the student. If the student was in the middle of the sentence, the student was allowed to complete the sentence; however the student only received credit for words read up to one minute. The experimenter marked the passage with a bracket at the end of one minute. The experimenter then calculated the number of words read correctly by subtracting the errors made from the total number of words read in one minute. Both words read correctly and errors were recorded.

The same school psychologist did the DIBELS and TORF assessments. Unfortunately, this assessor was not blind to the treatment condition of these students. In order to ensure that this assessor's bias played no role in this study, a reading teacher was hired as an independent evaluator. She assessed the children with the WDRB and scored the protocols independently with the appropriate scoring software. She was blind to the instructional conditions in this study and the initial performance of students on the Concept in Print Test.

Analysis

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Results

An Analysis of Variance was used to determine the differences between instructional conditions in the following comparisons. The results indicate that students in the four classes did not differ in their initial reading scores as measured by the Concept in Print test. ($F = 2.13$ df 3 $p = .11$)

Table 1. Shows the Concept in Print mean and median scores for the two Horizons and two Silver Burdette and Ginn classes

Table 1. Concept in Print Test Scores from June of Kindergarten

Condition		Mean	Median
Silver, Burdett, and Ginn with prior PA	195	197	
Silver, Burdett, and Ginn without prior PA	196	191	
Horizons Fast Track A-B with prior PA	202	204	
Horizons Fast Track A-B without prior PA	193	202	

Effect of Instruction on Phonological Segmentation Fluency Scores

There was a significant difference between Horizons Fast Track A-B and Silver, Burdett, and Ginn on phonological segmentation fluency by December. A repeated measure ANOVA indicated that there was a significant difference between the curriculum used ($F = 4.64$ df 3 $p < .01$) and a significant time effect ($F = 52.88$ df 4 $p < .0001$). There was no time by curriculum interaction effect. Students in the Horizons Fast Track A-B curriculum significantly outperformed student in the control group even if they had been given Phonemic Awareness training. Students in the Horizons Fast Track A-B curriculum who had prior phonemic awareness training began the year at a significant advantage in phonological segmentation skill. This set a pattern that allowed them to progress quickly and achieve excellent reading results in a few months. Students in the Horizons Fast Track A-B curriculum without the benefit of prior phonemic awareness training initially began at the same level as students receiving instruction in a conventional basal reader, but by December began to accelerate in their phonological segmentation skills. Figure 1 shows the improvement in mean scores for each of the four classes. It is apparent that the Horizons classes make substantial gains in phonological segmentation skills.

Table 2. Shows the mean phonological segmentation fluency scores for student in Horizons and Silver Burdett and Ginn Curricula from September to November and then in June.

Phonological Segmentation Fluency
Sept
Oct
Nov
Dec
June
Condition

Silver, Burdett, and Ginn with prior PA
18
37
33
34
52
Silver, Burdett, and Ginn without prior PA
19
21
23
30
46
Horizons Fast Track A-B with prior PA
34 **
50 **
60 **
56 **
70 **
Horizons Fast Track A-B without prior PA
23
31
38
49 **
65 **

(** p < .01)

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Table 3. Shows the mean Nonsense Word Fluency Scores for student in Horizons and Silver Burdett and Ginn Curricula from November to May

Nonsense Word Fluency				
Nov	Jan	Mar	May	
Condition	Mean	Mean	Mean	Mean
Silver, Burdett, and Ginn with prior PA				
43	45	54	58	
Silver, Burdett, and Ginn without prior PA				
27	30	45	60	
Horizons Fast Track A-B with prior PA				
71 *	89 *	93 *	112 *	
Horizons Fast Track A-B without prior PA				
46	54	81 *	100 *	

(** $p < .05$)

Effect of Instruction on Oral Reading Fluency

A Repeated Measures Analysis of variance was done using the monthly average scores on oral reading fluency probes. The results indicate that there was a significant effect of Curriculum ($F= 7.06$ df3 $p < .001$), Time ($F= 21.18$ df3 $p < .001$), and a Time by Curriculum Interaction effect ($F= 2.60$ df3 $p < .01$).

Horizons Fast Track A-B with prior PA differed significantly from Silver, Burdett, and Ginn classes and the Horizons Fast Track A- B without prior PA in oral reading fluency as measured by the TORF by January. By April, the Horizons Fast Track A-B without prior PA had improved and by May this group became almost as proficient in oral reading fluency as the Horizons fast Track A- B class with prior phonemic awareness. By May, it was evident that the effectiveness of

Horizons Fast Track A-B was considerable, as indicated by the proportion of variance accounted for ($R^2 = .44$). It is important to note that the expected instructional range in oral reading fluency in first grade ranges between 40 and 60 words per minute. This means that the Silver, Burdett and Ginn classes produced average effects on oral reading fluency, whereas, the Horizons Fast Track A-

done using the monthly average error scores from oral reading fluency probes. The results indicate that there was a significant effect of Curriculum ($F= 13.42$ df3 $p < .001$), Time ($F= 9.94$ df3 $p < .001$), but no Time by Curriculum Interaction effect ($F= 1.33$ df3 $p = .23$). In January, there was a significant difference between Horizons Fast Track A-B with prior PA instruction and all other classes ($F= 10.19$ df 3 $p < .001$). This pattern was evident in February and March. A Tukey-Kramer Pair-wise Comparison Test revealed that only the Horizons Fast Track A-B with prior PA instruction was significantly superior from January to March. However, by May the Horizons Fast Track A-B classes without prior PA became indistinguishable from the other Horizons Fast Track A-B class. In May, there was a significant difference between Horizons Fast Track A-B classes and the Silver, Burdett, and Ginn classes ($F= 10.62$ df 3 $p < .0001$). This effect is quite powerful as indicated by the proportion of variance accounted for ($R2 = .48$). These results are shown in Table 5.

Table 5. Shows the mean oral reading error scores for student in Horizons and Silver Burdett and Ginn Curricula from January to May

Oral Reading Errors	Jan	Feb	Mar	May
Condition	Mean	Mean	Mean	Mean
Silver, Burdett, and Ginn with prior PA	6.1	5.7	4.55	4.22
Silver, Burdett, and Ginn without prior PA	7.1	4.85	5.71	4.57
Horizons Fast Track A-B with prior PA	0.8 **	0.8**	1.5 **	0.6**
Horizons Fast Track A-B without prior PA	4	2.7	2.85	

1 **

(** p < .001)

Effects of Instruction on Woodcock Diagnostic Reading Test

It was found that there were significant differences between Horizons Fast Track A-B and Silver, Burdett, and Ginn classes on the WDRB standardized letter/word identification subtest scores (F= 3.33 df 3 p < .05) and between standardized word attack subtest scores (F= 4.36 df 3 p < .01). There was no difference among the classes on standardized passage comprehension scores (F= 1.46 df 3 ns). The Horizons Fast Track A-B with prior phonological awareness was significantly better than Silver, Burdett, and Ginn classes in letter word identification and word attack skill, as indicated by a Tukey Kramer Pair-Wise Comparison. This effect was moderately powerful, as indicated by the proportion of variance accounted for (R2 = .27).

Table 5. Shows the mean factor scores on the WDRB for student in Horizons and Silver Burdett and Ginn Curricula in May

Woodcock Diagnostic Reading Battery		
Letter Word ID	Word Attack	Passage Comprehension
Condition		
Silver, Burdett, and Ginn with prior PA		
115	115	116
Silver, Burdett, and Ginn without prior PA		
112	114	115
Horizons Fast Track A-B with prior PA		
127 *	121 **	126 *
Horizons Fast Track A-B without prior PA		
121 *	121 **	

Note standard scores have a mean of 100 and a standard deviation of 15
(* p < .05) (** p < .01)

Effect of instruction Word Reading Efficiency
There was a significant difference between Horizons Fast Track A-B with prior PA and Silver, Burdett, and Ginn instruction on the Test of Word Reading Efficiency (F= 6.20 df 3 p < .001). A Tukey-Kramer Pair-Wise Comparison supported this conclusion. This effect was moderately powerful (R2 = .34).

Table 6. Shows the mean total scores on the TOWRE for student in Horizons and Silver Burdett and Ginn Curricula in May
Test of Oral Word Reading Efficiency
Mean Score
Condition

Silver, Burdett, and Ginn with prior PA
108
Silver, Burdett, and Ginn without prior PA
111
Horizons Fast Track A-B with prior PA
125 **
Horizons Fast Track A-B without prior PA
120 **

Note standard scores have a mean of 100 and a standard deviation of 15
(** p < .01)

The Dynamic Indicators of Basic Early Literacy Skills (DIBELS), the Test of Oral Reading Fluency, the TOWRE, and the WDRB were correlated to determine the degree of relationship among these measures. Letter/word identification has a significant positive correlation with phonemic segmentation fluency, nonsense word fluency, and oral reading fluency. The correlation varied between
.53 and .73. Table 6. shows the correlation among the measures used in this study.

Word attack scores were significantly positively correlated with phonemic segmentation fluency, nonsense word fluency, and oral reading fluency. The range went from .56 to .58. The Concepts about Print Test was not correlated with the WDRB subtests, nonsense word fluency, oral reading fluency, or reading errors. The results indicate that there is no relationship between the Concepts about Print Test and these other measures.

Passage comprehension was correlated with phonemic segmentation fluency, nonsense word fluency, and oral reading fluency. The correlation ranged between .44 to .68. The subtests of the WDRB correlated as well with the DIBELS and Test of Oral Reading Fluency as they did among

themselves. This confirms the criterion-referenced validity of DIBELS and TORF measures. The TOWRE was significantly correlated with phonemic segmentation fluency, nonsense word fluency, and oral reading fluency and the subtest of the WDRB. The correlation ranged between .65 to .87. The Concept in Print test was not correlated with the TOWRE.

Table 6 Shows the Pair wise Correlation among Reading Measures

Variable	by Variable	Correlation	Sig. Prob.
Phonemic Segmentation	Concept in Print	0.11	0.6137
Nonsense Word	Concept in Print	0.16	0.3117
Nonsense Word	Phonemic Segmentation	0.72	0.0001
Words Read Correctly	Concept in Print	0.18	0.2623
Words Read Correctly	Phonemic Segmentation	0.70	0.0004
Words Read Correctly	Nonsense Word	0.87	0.0001

Fast Track A-B, greatly improved their skills. By June, these students had attained scores almost equal to the Horizons Fast Track A-B with prior phonemic awareness training.

Students who received Horizons Fast Track A-B did much better on measures of reading fluency, reading accuracy, and nonsense word reading than students who received instruction in Silver, Burdett, and Ginn. Regardless of the reading task - reading nonsense words, reading unfamiliar passages fluently without errors, decoding unfamiliar words, displaying word attack skills, or completing missing words in sentences - the students who received phonemic awareness instruction and Horizons Fast Track A-B did much better than students who received instruction in Silver, Burdett, and Ginn. Students who received Horizons Fast Track A-B without prior phonemic awareness instruction gradually increased their skills so that they had almost the same level of reading fluency and accuracy as those who had intense phonemic awareness in kindergarten. This suggests that direct instruction in first grade can help close the gap produced by a lack of previous enrichment. It certainly supports the claim of the author that it is an accelerated reading program.

Although students in one Silver, Burdett, and Ginn class had several hours of phonological awareness training in September and early October and had received several weeks of intervention in kindergarten, this was not sufficient to accelerate their reading acquisition. This is not entirely consistent with the findings of Foorman (1989) who concluded that kindergarten instruction in phonemic awareness improved first grade reading performance, compared to students who did not receive this instruction.
Byrne and Fielding-Barnlsey (1991) found that phonemic awareness training improved children's ability to decode unfamiliar words. They conclude that phonological awareness and letter knowledge is necessary, but not sufficient for the acquisition of the alphabetic principle. These results appear to support this conclusion as well and suggests that in addition to phonological awareness and instruction in letter recognition that is common to most kindergarten and first grade reading instruction, it is necessary to provide systematic phonics instruction, teach blending, and give children considerable opportunity to read decodable text. In addition spelling lessons should reinforce the relationship between sounds and spelling patterns. Foorman et al. (1991) found that letter sound instruction mediates progress in first grade reading and spelling acquisition.

It may be that generalization of phonics skills is more difficult to obtain in a literature-based basal curriculum where vocabulary is not controlled and phonics lessons are not linked to passages of connected text as suggested by Adams (1990). It may be the case that initial at risk students in the Silver Burdett and Ginn curriculum improved as a result the phonemic awareness training so that they performed in the average range in Tw (lett5os5os5os rae) T oera and hqsuge range in Tema.q0277 Tc 0.215

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Horizons was very accurate and made fewer than two errors while reading between sixty and ninety words a minute.

In contrast, students who received instruction in Silver, Burdett, and Ginn made four, five, and sometimes as many as seven errors when reading forty to fifty words a minute. The range of scores for students in Horizons Fast Track A-B was much narrower for reading errors. This suggests that students in this program developed their skills more evenly. The pattern over time indicates that weaker students made more dramatic improvements with Horizons, whereas, stronger students did not increase reading fluency as rapidly. This is because they were already quite fluent earlier in the

This study reveals that the less familiar assessment tools of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) and the Test of Oral Reading Fluency have criterion validity with respect to reading. The WDRB and TOWRE yielded similar results as these less familiar measures and the subtests of the WDRB were positively correlated with these measures. In fact the subtest of the Woodcock Diagnostic Reading Test correlated as well with the DIBELS and TORF as they did with each other. This supports the criterion validity of the DIBELS and TORF and is consistent with the work of Shinn (1989) and Hintze et al (2000)

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