Chapter # 20

EFFECTS OF REAL-WORD VERSUS PSEUDO-WORD PHONICS INSTRUCTION ON THE READING AND SPELLING ACHIEVEMENT IN FIRST GRADERS

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ABSTRACT
This study compares two methods of phonics instruction: real-words versus pseudo-words, on Lebanese first graders to determine the approach that will yield better reading and spelling achievements. To that end, two mixed level groups of three students each were selected. Students' achievement in reading and spelling both real-words and pseudo-words was tested before (pretests) and after (posttests) the intervention using four subtests of the Woodcock-Johnson-III Tests of Achievement. The intervention consisted of a total of 20 sessions (30 minutes each) of phonics instruction based on the Recipe for Reading program. Both groups received the same intervention and followed the same lesson plan. The only difference was in the type of word lists provided for each group. One group was exposed to real words only and the other group to pseudo-words only. Results showed that the phonics instruction based on real-words was more effective in improving decoding of real words, spelling of real-words, and spelling of pseudo-words. The effectiveness of the real-word method was very significant especially with at-risk students. On the other hand, the pseudo-word instruction showed slight improvement with average students in reading real words and pseudo-words, and spelling pseudo-words.

Keywords: decoding, pseudo words, spelling, first graders, Lebanon.

1. INTRODUCTION

1.1. Overview

Reading and spelling are the building blocks of the elementary school curriculum. Well-designed and well-implemented reading and spelling instruction yields several benefits that students will reap throughout their schooling years (Moats, 2000). Students who become fluent in reading in their early years, kindergarten, and first grade are more likely to enjoy reading and to develop their knowledge of words and language patterns (Cunningham & Stanovich, 1998). On the other hand, young students who fail to read well will dislike reading and will perceive it as a struggle (Juel, 1996). These students will face problems in their vocabulary growth, knowledge acquisition, and writing skills, and will become at a greater risk of school failure and lifelong problems with employment, self-determination, and social adjustment (Moats, 2000). Reading failure begins during children's first school years (Ehri, 1998; Pikulski & Chard, 2005) and the struggle goes on as they get older (Adams, 1990; Juel, 1996; Stanovich, 1986). Stanovich (1986) explains this phenomenon as the Matthew Effect where "the rich get richer and the poor get poorer" (p. 38). Students who are able to make letter-sound correspondence (phonemic awareness)

will have greater opportunities to reach automaticity and fluency. Students with weak letter-sound correspondence will perform poorly in reading and thus will start falling into a descending vortex of achievement that will be affected by the negative motivational consequences of failure.

Studies have found that classroom instruction is the best remedy for reading difficulty (Adams, 1990; Snow, Burns, & Griffin, 1998). Appropriate, skillful, and informed instruction can amend most of the reading and spelling problems that students face during their school years. Therefore, effective reading and spelling instruction must be provided in early school years to avoid having lifelong struggling readers and spellers. The most common instruction that can be implemented to fill this gap is phonics; however, the way to apply it is not definitive. Several phonics instructional approaches are used to teach reading like the analytic phonics, synthetic phonics, phonics through spelling, analogy phonics, and embedded phonics (National Reading Panel, 2000a). Every one of these approaches caters for different individual needs of different students.

The phonics approach follows an explicit method to teaching reading and spelling skills. It teaches students phonemes, graphemes, letter-sound correspondence, spelling patterns, and blending letters into words. As a result, better decoding skills can be achieved when systematic phonics instruction is applied (Stahl, Duffy-Hester, & Doughtery Stahl, 1998). As for spelling, it was found that systematic phonics is helpful for young students, who are at grade one or below, and not older ones (Ehri, Nunes, Stahl, & Willows, 2001; National Reading Panel, 2000b).

Recently, some reading specialists such as Steve Dykstra, Bill Keeney, Ellen Engstrom, and others have hypothesized that teaching phonics using pseudo-words (nonsense words) may be more beneficial than using real words (SpellTalk Discussion Group, 2013). Pseudo-words are used mostly in tests that assess students' reading and spelling achievement and are rarely considered as teaching tools. Educators who prefer using pseudo-words argue that students usually rely on guessing strategies or on their prior knowledge and memory to recall how words are pronounced and spelled. Thus, basing the phonics instruction on pseudo-words will increase the probability that students will develop decoding and encoding skills simply because they will be exposed to words they haven't seen, heard, or memorized before (Farrell, Osenga, , & Hunter, 2010). On the other hand, those who prefer using real words wonder why students should spend time learning words that are not real or meaningful. Practicing nonsense words, they would argue, will not lead to enriched vocabulary and improved comprehension so using them makes no sense. Since there is no general agreement and consensus on the best approach, more studies are needed to examine both methods. This study examines the effectiveness of two methods of phonics instruction, real words versus pseudo-words, on first graders to determine the one that will yield better reading and spelling achievements.

1.2. Purpose of the Study

The aim of this study is to explore the better approach to teach reading and spelling, real-word vs. pseudo-words, and make recommendations to reading instructors both in the mainstream and special education.

1.3. Research Question

Which phonics instruction method would result in more significant gains with first grade readers and spellers: real words or pseudo-words?

1.4. Hypothesis

The hypothesis of this study is that the phonics approach that is based on pseudo-words will lead to better results on both real word and pseudo-word reading and spelling tests, based on the assumption that students exposed to this approach strengthen their memory of phonics more than their memory of sight words when reading or spelling.

1.5. Significance of the Study

The utility of real words versus pseudo-words as screening and assessment tools has been extensively investigated (Byrne & Fielding-Barnsley, 1993; Farrell et al, 2010; Pullen, Lane, Lloyd, Nowak, & Ryals, 2005). Although an earlier study claimed that students skilled at decoding pseudo-words become independent and competent readers (Byrne & Fielding-Barnsley, 1993), only one published study has explored the use of pseudo-word as an instruction tool. Results revealed that pseudo-word phonics instruction during one month improved students' decoding skills faster than the real word phonics instruction (Cardenas, 2009). Finally, an unpublished dissertation compared the use of a combination of a reading instruction approach on kindergartners with real and pseudowords vs. word work instruction with real words only with respect to decoding accuracy and automaticity. Results suggested that that incorporating pseudowords within decoding instruction with emergent readers is just as effective as using real words alone (Madsen, 2014).

This study makes a unique contribution to the field of reading remediation in the hope of guiding teachers to the most effective strategies to maximize their students' reading achievement.

2. METHODOLOGY

2.1. Research Design

The study is quantitative in nature and uses the quasi-experimental design. Intervention was applied to two groups: the control group which received real word phonics intervention, and the experimental group which received pseudo-word phonics intervention. The independent variable for this study is the type of phonics instruction (real word versus pseudo-word) and the dependent variable is the students' reading and spelling achievement.

2.2. Setting

The study was conducted in a middle-class private school located in the suburbs of Beirut that uses Arabic and English as languages of instruction. The intervention sessions took place in a classroom equipped with computers.

2.3. Sampling and Participants

A purposive-convenient nonrandom sampling technique was adopted for this study. Participants included first graders whose reading and spelling achievements range from average to at-risk. Six first graders were selected from different sections forming 2 triads consisting of one boy and two girls. The real word group is referred to as Real1, Real2, and Real3, whereas the pseudo-word group as Pseudo1, Pseudo2, and Pseudo3.

2.4. Teaching Material

The *Recipe for Reading* (Bloom & Traub, 2005) was used. It relies on the synthetic approach, provides multisensory, explicit cumulative instruction, and phonetically controlled sentences, with built-in evaluation modules.

2.4.1. Recipe for Reading

Recipe for Reading was adapted from the Orton-Gillingham approach and developed by Nina Traub and Frances Bloom in the 1970s. It is a research-based program that has had significant effectiveness on students' reading and spelling achievements compared to other intervention programs (Russo, 2000). It is a multisensory, comprehensive, systematic, and synthetic phonics-based approach that can be implemented as a main program or as a supplement for poor readers.

With respect to its content, the recipe program includes 105 lessons that start at the letter sound level then progress to sound blending. All the lessons follow the same format whereby students have to respond to sound cards, spell sounds, make words from letter cards, spell and read these words, and spell and read sentences from flash cards. One important aspect of Recipe for Reading is revision. Previous lessons that have been taught should be reviewed before any new concept is introduced (Russo, 2007).

In terms of its target learners, Recipe for Reading best fits the needs of beginning readers from kindergarten till grade three, as well as at-risk and struggling readers in grades one till six. It can be used in different instructional settings like inclusion, one-to-one, small group, and an entire class (Russo, 2007).

2.5. Instruments

For the pre and post assessment, the following was used: The Woodcock Johnson III tests of Achievement (Letter-Word Identification, Word Attack, Spelling, and Spelling of Sounds). Pre tests and posts were administered end of April and at the middle of May respectively. Students' chronological ages ranged between 6-4 and 6-9.

2.5.1. Woodcock-Johnson III Tests of Achievement

The Woodcock Johnson III Tests of Achievement (WJ III ACH) consists of 22 tests that measure reading, mathematics, and writing skills, as well as oral language abilities and academic knowledge (Wendling, Schrank, & Schmitt, 2007). For the purpose of this study, four subtests (Letter-Word Identification test, Word Attack test, Spelling test, and Spelling of Sounds test) were used to measure students' achievements in reading and spelling both real and pseudo-words. Other subtests were disregarded because they focused on certain skills that were not addressed in this study. The researcher administered these subtests two times, once directly before starting the intervention, and once directly after the end of the intervention. Mather, Wendling, and Woodcock (2001) described these four subtests as such:

Letter-Word Identification test: In this test, students are asked to identify and pronounce isolated letters and words like: g, r, cat, and palm.

Word Attack test: In this test, students are asked to pronounce non-words that conform to English spelling rules like: flib and bungicality.

Spelling test: In this test, students are asked to write the spelling of words presented orally.

Spelling of Sounds test: In this test, students are asked to spell non-words that conform to English spelling rules like: barches and smuff.

2.6. Procedure

At the beginning, before starting the intervention, students' achievement level in reading and spelling of both real words and pseudo-words was determined (pretests) by administering four subtests from the Woodcock-Johnson III Tests of Achievement (Letter-Word Identification test, Word Attack test, Spelling test, and Spelling of Sounds test). These subtests were administered individually for the students in both groups. At the end, the same WJ-III subtests were administered for all the students to measure their improvement.

2.7. Intervention

This study was conducted over a period of two weeks during the third term of the 2013-2014 scholastic year. Every group received 20 intervention sessions of 30 minutes each. Students were pulled out during their English sessions. The same procedure and intervention were applied with both groups. The only difference was in the content of the word lists provided in every lesson of the *Recipe for Reading* program. For example, the short /u/ sound was illustrated with read real words like *cup* and *jump*, whereas for the pseudo-word group, letters examples were replaced with non-real words like *lup* and *kump*. Intervention for both groups was provided by one of the researchers (Khalifeh Mohamad).

During these twenty sessions, students in both groups were introduced to 20 letters/sounds (one letter/sound per session). The order of presenting these letters and sounds followed the same sequence adopted by the *Recipe for Reading*. The letters taught are: c, o, a, d, g, m, l ,h, t, i, j, k, p, ch, u, b, r, f, n, and e. The vowel lessons taught during the intervention included short sounds only.

At the end of every lesson, students completed some activities designed by the researchers to reinforce the concepts at hand. A review of the previous lessons was done at the beginning of every session.

3. RESULTS

The four subtests of the WJ-III Tests of Achievement were administered by the researcher (Khalifeh Mohamad) at the end of April (pre-test) and at the middle of May (post-test) of the 2013-2014 academic year. This means that the students were at the end of grade 1.7 during the pretest and at the middle of 1.8 during the post-test. Students 'chronological ages ranged between 6-4 and 6-9.

Students' results on the four subtests were tabulated to show their age equivalence (AE), grade equivalence (GE), and standard scores (SS) prior to and after intervention. The difference of the standard score results in pre-test and post- test was calculated for every student to show the individual level of improvement. Every group's mean standard score was also calculated prior to and after intervention and the difference was tabulated to show the average level of improvement for the group as a whole. Standard scores have a mean which is equal to 100 and a standard deviation (SD) which is equal to 15. Results are considered to be statistically significant if they have a +1SD.

3.1. Letter-Word Identification

Students of the pseudo-word group showed better results in the pretest compared to the real word group. Their GE ranged between 1.0 and 1.3 compared to K.6 and 1.2 to the real word group. Their mean standard score in the pretest was 8.34 points (102.67 - 94.33) more than that of the other group. In the post-test, students of both groups showed improvement in their standard scores. Again, the mean standard score of the pseudo-word group in the post-test was greater than that of the real word group but this time the difference was much less (2 points). It was noted that the students who got the lowest SS in the pretest made the greatest improvement which reached a +1SD (student Real1 and Real2). As a final result, the real word group showed more improvement in their ability to read real words in isolation although they started with a lower initial standing compared to the pseudo-word group. The results of the Letter-Word Identification subtest (pretest and post-test) for both groups are summarized in Table 1 below.

Table 1. WJ-III ACH Letter-Word Identification Pre and Post Test Results.

Student	Pre-Test			Post-Test			Difference in SS
	AE	GE	SS	AE	GE	SS	
Real1	5-11	K.6	92	6-8	1.4	107	15
Real2	5-11	K.6	86	6-9	1.5	102	16
Real3	6-6	1.2	105	6-7	1.3	106	1
	Mean SS		**94.33**	**Mean SS**		**105.00**	**10.67**
Pseudo1	6-4	1.0	97	6-9	1.5	105	8
Pseudo2	6-7	1.3	107	6-9	1.5	110	3
Pseudo3	6-8	1.3	104	6-10	1.5	106	2
	Mean SS		**102.67**	**Mean SS**		**107.00**	**4.33**

3.2. Word Attack

Students of both groups had equivalent scores in the Word Attack pretest. Every group had two students whose GE=K.8 and AE=6-1 and one student whose GE=1.2 and AE=6-7. The difference among these students in the standard scores is referred to the difference in their chronological age. The mean standard score for both groups was almost equivalent (97 and 96.67).

In the post-test, students of both groups showed improvement in their ability to read pseudo-words in isolation. The improvement was significant (+1SD) for both groups. The improvement of the pseudo-word group was slightly more than that of the real word group.

It was noted that the students who got the lowest SS in the pretest made the greatest improvement which reached a +1.46 SD (student Real2 and Pseudo1).

Overall, the pseudo-word group showed a slight more improvement (1.67 SS) in their ability to read pseudo-words in isolation. The results of the Word Attack subtest (pretest and post-test) for both groups are summarized in Table 2 below.

Table 2. WJ-III ACH Word Attack Pre and Post Test Results.

Student	Pre-Test			Post-Test			Difference in SS
	AE	GE	SS	AE	GE	SS	
Real1	6-1	K.8	95	6-1	1.5	108	13
Real2	6-1	K.8	89	7-5	2.1	111	22
Real3	6-7	1.2	107	7-5	2	114	7
	Mean SS		**97.00**	**Mean SS**		**111.00**	**14.00**
Pseudo1	6-1	K.8	92	7-5	2.1	113	21
Pseudo2	6-1	K.8	97	7-2	1.8	114	17
Pseudo3	6-7	1.2	101	7-6	2.2	110	9
	Mean SS		**96.67**	**Mean SS**		**112.33**	**15.67**

3.3. Spelling

Students of the pseudo-word group showed better results in the pretest compared to the real word group. Their mean SS was 99.67 and that of the real word group was 94.33, thus the difference between both groups was equal to 5.34 points.

In the post-test, students of both groups showed improvement in their standard scores. However, the mean standard score of the pseudo-word group (105.33) in the post test was greater than that of the real word group (103.67). The difference was equal to 3.66 SS which is equivalent to 0.24 SD.

As a final result, the real word group showed more improvement in their ability to spell real words in isolation although they started with a lower initial standing compared to the pseudo-word group. The results of the Spelling subtest (pretest and post-test) for both groups are summarized in Table 3 below.

Table 3. WJ-III ACH Spelling Pre and Post Test Results.

Student	Pre-Test			Post-Test			Difference in SS
	AE	GE	SS	AE	GE	SS	
Real1	5-8	K.4	88	6-5	1.1	102	14
Real2	6-1	K.8	89	6-7	1.3	98	9
Real3	6-5	1.1	106	6-8	1.3	111	5
	Mean SS		**94.33**	**Mean SS**		**103.67**	**9.33**
Pseudo1	6-5	1.1	98	6-7	1.3	101	3
Pseudo2	6-5	1.1	104	6-1	1.5	114	10
Pseudo3	6-5	1.1	97	6-8	1.4	101	4
	Mean SS		**99.67**	**Mean SS**		**105.33**	**5.67**

3.4. Spelling of Sounds

Students of the pseudo-word group showed better results in the pretest compared to the real word group. Their mean SS was 103.33 and that of the real word group was 97.0, thus the difference among both groups was equal to 6.33 points.

In the post-test, students of both groups showed improvement in their standard scores. Again, the mean standard score of the pseudo-word group (115.33) in the post test was greater than that of the real word group (112) by 3.33 SS points.

It was noted that the students who got the lowest SS in the pretest made the greatest improvement which reached a +1.33 SD (student Real2 and Pseudo2).

As a final result, the real word group showed more improvement in their ability to spell pseudo-words in isolation although they started with a lower initial standing compared to the pseudo-word group. Their improvement was statistically significant (+1SD). The results of the Spelling of Sounds subtest (pretest and post- test) for both groups are summarized in Table 4 below.

Table 4. WJ-III ACH Spelling of Sounds Pre and Post Test Results.

Student	Pre-Test			Post-Test			Difference in SS
	AE	GE	SS	AE	GE	SS	
Real1	6-1	K.8	94	7-2	1.9	112	18
Real2	6-2	K.9	91	7-5	2.1	110	19
Real3	6-6	1.2	106	7-5	2.1	114	8
	Mean SS		**97.00**	**Mean SS**		**112.00**	**15.00**
Pseudo1	7-2	1.8	109	8-0	2.6	116	7
Pseudo2	6-2	K.9	98	7-7	2.3	118	20
Pseudo3	6-8	1.3	103	7-8	2.3	112	9
	Mean SS		**103.33**	**Mean SS**		**115.33**	**12.00**

3.5. Comparison according to performance levels

Real1-Pseudo1 and Real2-Pseudo2 participants have equivalent performance levels and can be referred to as below average readers and spellers. Whereas Real3-Pseudo3 have also equivalent performance level but they can be referred to as average readers and spellers.

To better compare the rate of improvement of every student in terms of standard scores and compare it to his friend who has equivalent performance in the opposing group, a table (Table 5) was drawn to summarize these results for every test.

Table 5. Comparison of Standard Score Improvements Between Students of Equivalent Performance Levels.

	Letter-Word Identification	Word Attack	Spelling	Spelling of Sounds
Real1 vs. Pseudo1	15 - 8	13 - 21	14 - 3	18 - 7
Real2 vs. Pseudo2	16 - 13	22 - 17	9 - 10	19 - 20
Real3 vs. Pseudo3	1 - 2	7 - 9	5 - 4	8 - 9

4. ANALYSIS AND DISCUSSION

The results of the Woodcock Johnson III subtests revealed that the phonics approach, regardless of the type of words used, helped students develop their decoding and encoding skills. The posttest results of the four WJ-III subtests showed that students of both groups have made good improvement in reading and spelling real words and pseudo-words as compared to pretests. This improvement was in many cases statistically significant.

The results also revealed that the phonics approach was more effective for at-risk than for average students. At-risk students were able to make significant improvements (>=+1SD) in the post-tests. When the intervention was initiated, most of the students were at the lower limit of the partial alphabetic level of reading and spelling development. Their knowledge of the alphabetic system was not complete, and they were incapable of decoding unfamiliar words. Most students were unable to read new words by analogy to familiar words because their lexicon of sight words was limited. As for spelling, given their partial knowledge of the alphabetic system, students used invented spelling by relying on the most salient letters in the word.

To measure the effectiveness of real word versus pseudo-word instruction, comparisons between the two groups as a whole then among students matched by level of performance are proposed.

For the former, the WJ-III results revealed that the real word group outperformed the pseudo-word group in reading real words, spelling real words, and spelling pseudo-words. The greater difference in improvement was in favor of the real word group in the Letter-Word Identification test despite the initial advantage of the pseudo-word group who scored higher in the pretest. The results of the Letter-Word Identification test and Spelling test can be attributed to the reading and spelling strategy that the students used, namely decoding and encoding by sight, relying mostly on rote memory. Students in the real word group were exposed to meaningful words repeated several times during the intervention sessions. When students look at words and read them, their alphabetic system knowledge is stimulated, and in turn, they form a connection between the word's grapheme and phoneme. Reading a word several times creates an amalgam that combines a specific decoding pattern, encoding and meaning and stores it in long-term memory (Ehri, 2000).

The pseudo-word group also read pseudo-words several times, yet their performance was not up to par. A possible explanation is that pseudo-words have no meaning so the amalgam that should have been created was not complete, consequently their retrieval was faulty.

The results of the Spelling of Sounds test which taps written phonics showed that the real word group made better improvement than the pseudo-word group even though their instruction was based on real words. This pattern is consistent with the research claims that spelling is more demanding than reading. Pseudo-word group members were not able to transfer their knowledge of pseudo-word reading rules to pseudo-word spelling. As for the real word group, their higher scores on the Spelling of Sounds test may indicate that they had depended on the *analogy strategy* to spell the pseudo words. Their emergent lexicon of sight words had allowed them to derive phonics rules for encoding.

When comparing the results of students matched by performance between the two groups, we find that the at-risk student in the real word group outperformed his peer in the pseudo-word group in all skills except Word Attack. The difference in improvement is recognizable. This implies that the pseudo-word instruction is not effective with struggling

readers and spellers who are at the lower limit of the partial alphabetic level of reading and spelling development where the learner needs to build a repertoire of words in their lexicon so that they can refer to when reading or spelling new words (Ehri, 2005). Since pseudo-words are meaningless, their encoding in long-term memory seems unstable relative to that of real words. However, if we compare the results of average students across groups, we find that the pseudo-word group made better improvement in all areas except spelling. The difference of the level of improvement between both students in the average group was minimal (maximum 2 SS) compared to that of the below average students (maximum 11 SS). The average students have developed a good knowledge of the alphabetic system and letter-sound correspondence and already have a good repertoire of words to refer to. This repertoire of words helps average students read or spell analogous words. However, if they encountered unfamiliar words which do not have a specific match in their lexicon, they fail at the task (Ehri, 2000; 2005).

In sum, phonics instruction based on real words was more effective in reading real words, spelling real words, and spelling pseudo-words. The effectiveness of the real word method was more evident with at-risk students. On the other hand, the pseudo-word instruction was slightly more effective with average students in reading real words and pseudo-words, and spelling pseudo-words. Thus, the hypothesis of this study was validated only for average students, but not for struggling readers and spellers.

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

This study gave insights into the effectiveness of real words versus pseudo-words on the reading and spelling abilities of first graders.

Based on the findings, teachers are urged to avoid using pseudo-words in their phonics instruction for at-risk students, and focus instead on real words, while continuing to use non-words in progress monitoring and other assessment activities. For other students, including pseudo-words occasionally in their reading and spelling instruction can help reinforce decoding and encoding skills, and strengthen their knowledge of phonics rules.

5.2. Future Studies

This study should be replicated across different schools, different grade levels and larger samples in order to be able to generalize the results. Moreover, a third experimental group may be added to the study that combines real words and pseudo-words intervention. Finally, a mixed-method (quantitative and qualitative) approach is recommended whereby participants are interviewed about the personal strategies used to read and spell words at various stages of the experiment.

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