

THE EFFECTS OF EXPLICIT TEACHING OF MORPHEMIC ANALYSIS ON
VOCABULARY LEARNING AND COMPREHENSION AND ITS TRANSFER
EFFECTS TO NOVEL WORDS

A Thesis by

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B. A., Wichita State University. 1992

Submitted to the Department of Curriculum and Instruction
and the faculty of the Graduate School of
Wichita State University
in partial fulfillment of
the requirements for the degree of
Master of Education

May 2006

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DEDICATION

To my husband and children for all their patience and support

ACKNOWLEDGEMENTS

I would like to thank my adviser, Jeri Carroll, for her help, direction, and support the last two years. Many thanks also go to Kim McDowell for all her help, advisement, and patience on this research project. My other committee members, Jennifer Kern and B. J. Wells, deserve thanks for all their helpful comments and suggestions while working on this investigation.

ABSTRACT

This study investigated the effects of explicit teaching of morphemic analysis on vocabulary learning and comprehension and its transfer effects to novel words with sixth grade students. Because research states that vocabulary and the ability to decode unfamiliar words is vital for comprehension, an increase in vocabulary learning and comprehension was predicted. A sixth-grade reading class with low reading assessment results was specifically taught twelve affixes and roots chosen from a bank of morphemes tested in classroom theme and state reading assessments. The 18 students received pre- and –post assessments on comprehension and vocabulary with an additional post-assessment on transfer effects. Results showed significantly higher post-assessment scores, but no visible improvement on student transfer to novel words.

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CHAPTER 1

INTRODUCTION

Since the National Institute of Child Health and Human Development (NICHD) released the National Reading Panel's (NRP) report of the effectiveness of various approaches to teaching reading in April 2000, educators have been evaluating their strategies in teaching reading. Those strategies must encompass the findings of the NRP and what the Reading First panel have labeled the five essential components of an effective literacy plan. Those components are: (a) phonemic awareness; (b) phonics, (c) reading fluency, (d) vocabulary development, and (e) comprehension. While much has been researched in the early grades on these components, too little has been done to address the needs of students beyond the third grade (Tankersley, 2005). Specifically in the area of vocabulary development where a reader's vocabulary knowledge is the single best predictor of how well a reader can comprehend text (Nagy, 2004), there has been a lack of sufficient research for those students in the middle grades.

Tankersley (2005) suggests that an effective vocabulary program for students in grades 4-12 should include three main strategies (a) promoting broad and intensive reading and oral discussions, (b) encouraging students to experiment with words, and (c) explicitly teaching word meanings and word-learning strategies. Because middle school students are faced with progressively more difficult texts and vocabulary, they need strategies to help them decode and look at word part meanings (morphemic analysis) for better understanding of text.

Root words and affixes (suffixes and prefixes) are part of morphemic analysis and can be used to help students make informed predictions about words' meanings. A word

may have several morphemes (the smallest unit of meaning in a language), but there is a distinction between morphemes that can stand alone (free morphemes or roots), and those that need to be attached to another morpheme (bound morphemes or affixes) (Arendal, et al., 2001). Research can not agree on the best way to structure teaching of morphemic analysis, but they do agree that the benefits are there. “Graves and Hammond (1980) argue that there are three reasons for teaching prefixes (a) there are relatively few prefixes, and many are used in a large number of words, (b) most prefixes have relatively constant meanings that are easily definable, and (c) that prefixes tend to have consistent spellings”(as cited in Blachowicz and Fisher, 2004). Brown and Casden (1965) also indicated that approximately 30 root words, prefixes and suffixes provide the basis for more than 14,000 commonly used words in the English language (as cited in Tankersley, 2005).

With this research in hand and the knowledge that middle school students must know how to determine meaning of words through knowledge of word structure (Kansas State Standard R.6.1.3.4), the purpose of this study was to look at the effects of explicit teaching of morphemic analysis on vocabulary learning and comprehension, to determine if differences in outcomes were based on reading status (typical versus struggling readers), and what the transfer effects would be on unfamiliar vocabulary. It was hypothesized that students would improve their vocabulary learning and comprehension, there would be significant differences between typically developing readers and struggling ones, and transfer effects would be evident to untrained words. The difficulty in this study was the ability to unequivocally demonstrate that teaching vocabulary improves reading comprehension since vocabulary is learned both directly and indirectly.

Yet, it is clear, as the NRP Report specifically states, that vocabulary should be taught both **directly** and indirectly. Therefore, this study continues on with further literature review on reading comprehension, vocabulary, morphemic analysis, and a planned intervention for a sixth-grade reading class with struggling and typical readers to produce an effective strategy for improvement on vocabulary learning and comprehension.

CHAPTER 2

LITERATURE REVIEW

With the release of the NRP Report (2000) on teaching reading, educators have been studying ways to effectively teach students to read. Educators and research have focused specifically on strategies that work for the five components of reading (i.e., phonemic awareness, phonics, fluency, vocabulary, and comprehension). When addressing students in the middle grades and struggling readers, research shows that comprehension of a variety of texts in the content areas is vital for success, and that comprehension is strongly correlated to vocabulary knowledge and the ability to successfully analyze word parts (morphemic analysis) to decipher meaning (Texas Education Agency, 2000).

Reading Comprehension

“Comprehension is drawing meaning from words; it is the ‘essence of reading’ (Durkin, 1993), central both to academic and lifelong learning” (Tankersly, 2005, p. 108). The goal of the educator is to give students the ability to draw meaning from text. Students come into the classroom with their own unique life experiences, experiences with print, and varying abilities to process text. What one student comprehends from the text, the student right next to him will comprehend entirely different because comprehension is a purposeful interaction between the reader and the text. That interaction is shaped by prior knowledge and experiences. Some will come away with a rich understanding of the text, while others will have only a superficial understanding, and neither might understand the text in exactly the way the writer had in mind. The

various strategies the reader applies as they process text will influence the depth of their understanding (Johns and Lenski, 2005).

The federal government, under the reauthorization of the U.S. Elementary and Secondary Education Act in 2001, believed in this to the point of pledging \$900 million to the states for professional development and implementation of “research-proven” reading practices at the preK-3rd grade level (Tankersley, 2005). This recent interest in reading though, was focused on early literacy, defined as word recognition, in the primary grades. What was neglected was the core of reading: comprehension and reading in the secondary grades. What about the middle and high-school students? Those excellent third-grade readers will falter or fail in later-grades if the teaching of reading is neglected.

According to the International Center for Leadership in Education, entry-level jobs in the United States now have higher reading requirements than are necessary to graduate from high school. Yet, the National Assessment of Educational Progress (NAEP) showed that 37 percent of U.S. fourth-graders failed to meet the most basic reading performance levels and by eighth-grade, only 32 percent of students scored at or above the proficiency level, and 26 percent failed to qualify for the basic reading proficiency. The NAEP also showed results for the 2002 scores for twelfth-grade as lower than those in 1992 and 1998 (as cited in Tankersley, 2005, p.3). As students get older, scores continue to show significant decline. With the demand of high literacy comprehension in the workforce, educators need to address these declining scores in the middle and upper grades and look at comprehension strategies that focus on the needs of these students. More and more research focused on struggling readers makes a call to

action to break this cycle of low literacy through early intervention (i.e., as in sixth-, seventh-, and eighth-grade) programs before they reach high school (as cited in Paterson and Elliott, 2006). How then can reading comprehension be improved through research-validated instruction?

Vocabulary Instruction

“Vocabulary is a vital foundational thread in the tapestry of reading; it should be woven into the fabric of everything that is being studied” (Tankersley, 2005, p. 66).

Vocabulary consists of words and word meanings in both oral and print language. Oral vocabulary refers to words that we use in speaking or recognize in listening. Reading vocabulary refers to words we recognize in print or more specifically, words students must know in order to successfully comprehend increasingly demanding texts as they get older. In middle and high school, students encounter text and concepts in such fields as science, math, and social sciences that require different reading approaches from those used with more familiar forms such as literacy and personal narratives (Kucer, 2005). Lack of adequate vocabulary knowledge is a serious obstacle for many students and is one of the greatest factors between a typical reader and a struggling reader. Research shows that gaps in vocabulary established in the early years only intensify in later years. “A high-performing first-grade student knows roughly twice as many words as the low-performing first-grade student, and the gap only increases over the years. By twelfth-grade, high-performing students know approximately four times as many words as their low-performing peers” (as cited in Tankersley, 2005, p. 67). In other words, the good readers keep improving, while poor readers continue to do poorly, therefore widening the gap even more.

The NRP Report (2000) stated that quality vocabulary instruction led to gains in reading comprehension, but was reluctant to name a single method of vocabulary instruction that was most effective. Their reluctance stems from the fact that research on vocabulary instruction and development has not been a recent focus, especially on the middle and upper grades, and what research is out there has had difficulty demonstrating that teaching vocabulary improves reading comprehension (International Reading Association, 2002). Baker, Simmons, and Kame'eni (n.d.) also report that though the connection between reading comprehension and vocabulary knowledge is strong and unequivocal, the precise nature of the relationship between the two is still under investigation. This is probably related to the fact that vocabulary is learned both directly (systematic instruction) and indirectly (silent reading). But this still can not negate the most persistent findings in research that the extent of students' vocabulary knowledge relates strongly to their reading comprehension and overall academic success (as cited in Lehr, Osborn, and Hiebert, n.d.). This relationship makes sense when you realize that to get meaning from what they read, students need both an extensive vocabulary and the ability to use various strategies to establish the meanings of new words they encounter as they read. For struggling readers with limited vocabularies, it may be extremely important to make vocabulary the focus of instruction simple to develop their knowledge of word meanings.

In fact, Marzano, Pickering, and Pollock (2001) examined research for the systematic teaching of vocabulary, and the research of those who argue that there are too many words in the English language to teach, and vocabulary should be learned indirectly by spending time each day to read silently. Their findings were put into five

generalizations to help guide instruction in vocabulary and are as follows (a) students must encounter words in context more than once to learn them (without instruction they must be exposed to the word at least six times before they can ascertain and remember its meaning), (b) instruction in new words enhances learning those words in context (Students in Jenkins and others [1984] study who had prior instruction were about 33 percent more likely to understand new words than students who had no prior instruction even when this instruction consisted of only minimal study [40 seconds] of the word, its definition, and the word used in the sentence.), (c) one of the best ways to learn a new word is to associate an image with it, (d) direct vocabulary instruction works (Stahl and Fairbanks [1986] found in a major review of the research on vocabulary that teaching vocabulary directly increases student comprehension of new material by 12 percentile points), and (e) direct instruction on words that are critical to new content produces the most powerful learning (effects are even more powerful when words selected are those that students most likely will encounter when they learn new content) (cited in Marzano, Pickering, and Pollock, 2001). It is clear then, and the NRP Report (2000) concurs, that even though some vocabulary is learned indirectly, vocabulary should also be taught directly as an effective comprehension tool. Students learn vocabulary directly when they are explicitly taught both individual words and word-learning strategies (Armbruster, Lehr, and Osborn, 2001).

We know from research that the old teaching method of “assign, define, write a sentence, test” is not adequate for effective vocabulary development. In fact, Moats (2001) points out, “Effective vocabulary study occurs daily and involves more than memorizing definitions” (as cited in Tankersley, 2005, p. 74). Research seems to point to

the explicit teaching of word meanings and word-learning strategies. Independent word-learning strategies are techniques that teachers can model and teach to students to help them figure out the meanings of unknown words on their own. The Texas Education Agency (2000) suggested these key word-learning strategies (a) the efficient use of the dictionary, (b) the use of word parts (prefixes, suffixes, roots, and compounds) to unlock a word's meaning, and (c) the use of context clues. Teaching students to analyze the meaningful parts of words and look at the word structure equips them with the ability to infer word meanings and expand their reading vocabulary significantly (Baumann, et al., 2002; Scharer, Pinnell, Lyons, and Fountas, 2005; Tankersley, 2005)

Morphemic Analysis

Word recognition skills are critical to the development of skilled comprehenders, and older students should be taught prefixes, suffixes, and root words. Root words and affixes (suffixes and prefixes) are part of morphemic analysis and can be used to help students make informed predictions about words' meanings. In other words, morpheme is the name for meaningful word parts that readers can identify and put together to determine the meaning of unfamiliar words. It is estimated, in fact, that more than 60 percent of the new words that readers encounter have easily identifiable morphological structure – that is, they can be broken into parts (Lehr, Osborn, and Hiebert, n.d.).

Research suggests that student's ability to determine the meaning of new words while reading draws significantly on their knowledge of the structural aspect of the words (morphological knowledge) and is critical when they encounter less frequent words. Aronoff (1994) observed that “once past the early elementary grades, most new words encountered in reading are morphological derivatives of familiar words” (as cited in

Templeton and Pikulski, n.d.). In fact, while phonemic awareness makes a huge contribution to students' reading ability up to 3rd grade, morphological awareness then begins to become more important to the good reader's overall reading ability (Areendal, et al., 2001).

In order for students to grasp and have a good command of morphology they need to learn specific morphemic elements (prefixes, suffixes, and word roots) and the processes by which these morphemic elements combine. Unfortunately, there has been no compelling body of research that gives evidence of the efficiency of morphemic analysis or the best ways to teach it. In 1955 Otterman (as cited in Baumann, et al, 2002) noted that "research in this area [study of affixes and stems] is rather scanty, and the studies which have been made are not consistent in their findings." That remains true today as very little research has been done. In one of the few found, Baumann et al. (2002) noted this in their study with fifth-grade students when investigating the effects of morphemic and contextual analysis instruction on comprehension and learning of words presented during instruction. Their investigation showed a strong relationship between morphemic and contextual analysis instruction on vocabulary but little evidence that it enhanced students' comprehension. There is also very little research exploring the transfer effects of instruction in morphemic analysis to reading comprehension. Baumann et al. (2002) again explored this question and found that there was evidence of an immediate effect on transfer words in isolation, but no compelling evidence of its effects on comprehension. Thus, the question remains whether instruction in specific word-learning strategies can enhance the comprehension of text.

Students in middle grades are faced with multiple challenges in the amount of reading that is required and the difficulty of complex content area texts. The ability to successfully comprehend text with difficult vocabulary will be critical for their reading success. Research agrees that students at this level need to be directly taught vocabulary in strategies that include analyzing the meaningful parts of words to better understand new unfamiliar words and therefore better comprehend the text. Though research differs and findings are hard pressed to demonstrate that teaching vocabulary improves reading comprehension, it does agree that the greatest factor between a proficient reader and a struggling reader is lack of adequate vocabulary knowledge, and that a quality vocabulary instruction leads to gains in reading comprehension. Therefore, this investigation should find an improvement in vocabulary learning and comprehension with struggling readers showing greater gains than grade level readers when finished answering the following research questions: (a) What are the effects of explicit teaching of morphemic analysis on vocabulary learning and comprehension?, (b) Are there differences in outcomes based on reading status?, and (c) What are the transfer effects of morphemic analysis on novel words?

CHAPTER 3

METHODOLOGY

Participants

The school district where this study took place had a total enrollment of about 5,585 students. Although the district is located in a small town, the majority of its students come from middle- to upper middle-class households within a larger city's limits. About 92% of those students were listed as White, 4% as Hispanic, 2% as African American, and 2% listed as Other.

The school building included in this study houses around 664 sixth- and seventh-grade students. Approximately 51% were females, 49% were males, and only 11% qualified for free or reduced lunches. The ethnicity of the building, which was a good indicator of most of the individual classes, was classified as 86% White, 4% African American, 5% Hispanic, 4% Asian, and 1% American Indian.

The third hour sixth-grade reading class was selected as participants for this study because of their low scores on reading assessments. The class consisted of 18 students, 8 males and 10 females. Five students were reading below grade level (struggling) according to the standardized tests given at the beginning of the year. Those tests were the Scholastic Reading Inventory (SRI) and the Measures of Academic Progress (MAP). No students in the class received special services of any kind. One student was on a parent/student/teacher contract for organizational difficulties and had to have an agenda/assignment notebook signed every day.

Assessments

In order to address the first research question, a *Theme 3 Skills Test* (Houghton Mifflin, 2005) was administered pre- and post-intervention. The Skills test was part of the required evaluation of sixth-graders in the building and was also part of the adopted reading series. It consisted of 4 reading passages with 65 multiple choice questions. Included in those questions were 25 comprehension (making generalizations, inferences, story structure, problem-solution, and informational) and 40 spelling/vocabulary (spelling patterns, word endings, suffixes –en and –ing, and prefixes in-, im-, and con-). It evaluated the students' comprehension and vocabulary both before and after the intervention.

A morphemic analysis test (affixes and roots) was created from the Kansas State Department of Education (KSDE)'s test builder site which assessed seven prefixes and suffixes that were part of the state tested standards on the Kansas Reading Assessment and in a multiple choice format (see Appendix A). This test was also administered pre- and post-intervention to assess the students' knowledge of affixes and roots both before and after the intervention.

Finally, a researcher-generated assessment tool was administered following intervention. The purpose of this assessment was to test the second research question of transfer effects of morphemic analysis instruction. This assessment consisted of 10 multiple choice questions in the same format as the KSDE morphemic analysis test but introduced 10 untrained words containing the previously taught affixes to see if students could identify the word's meaning (see Appendix B).

Procedure

The procedure or intervention for this study consisted of whole-class instruction in the meanings of and use of two affixes every week (Tuesday and Thursday) for a total of six weeks in the classroom. Affixes that were directly taught were: auto-, con-, fore-, in/im-, multi-, sub-, -al, -en, -ify, -ize/yze, -ous, -some. Instruction of affixes was presented on the projector in the following format (a) the affix was presented in isolation with the definition (i.e., con- means put together), (b) four words containing the affix were presented (i.e., con-, construct, converge, conference, connect), (c) the whole words were put in sentences (i.e., The train and bus will **converge** at the intersection), (d) the words were defined (i.e., to converge means to come together at a point), (e) students added four more examples of the affix, by using the dictionary, in their vocabulary journal by doing some semantic webbing (word family list), (f) students created their own new words (an affixation word) (see Appendix C).

Students were asked to record in their journal (spiral notebook) the selected affix, its definition, and the four words containing the affix. Attention was then directed to the four sentences in which the words containing the prefix were located. After reading each sentence together, students collaboratively worked on the meaning of the word using their new knowledge of affix and root word meaning plus context clues. Collaborative groups were asked to share their definition and after whole class agreement, students recorded definitions in their journals. Students were then directed to the dictionaries to find four new words containing the selected affix to record in their journal as a semantic web with the affix as the middle bubble. Students were again allowed to work collaboratively, and when all groups were finished, sharing of their found words was

done whole class. For the last step in this process, students were asked to create their own word using the affix and a root of their choice. They recorded their created word and their definition for it in their journal under the title of affixionary. As students were creating their affixionary words, the teacher checked each student's journal for completed and correct recorded work, and a small sticker was placed on the page. Students were then encouraged to share their created affixionary word with the class trying to guess the definition. Each of the twelve selected affixes was presented in the same format. The journals were collected and kept in the class as available reference tools (see Appendix D).

CHAPTER 4

RESULTS

Preliminary Analyses

Descriptive statistics for the measures are provided in Table 1. There appears to be substantial range in performance on the vocabulary measures at pre- and posttest as well as substantial variance in scores on the comprehension measure at pretest. Data reported represent percents (e.g., 29.00 = 29% accuracy).

Table 1

Descriptive Statistics

Variable	Minimum	Maximum	Mean	Std. Deviation
Vocabulary pre	29.00	100.00	69.00	20.32
Vocabulary post	86.00	100.00	93.00	7.20
Comp. pre	52.00	94.00	79.89	11.02
Comp. post	68.00	97.00	83.50	7.59
Transfer	70.00	100.00	85.00	9.85

Note. N=18

To determine if the data were normally distributed, which would dictate use of parametric or nonparametric statistics, the data were examined for violations of normality. Using the Shapiro Wilks test of normality, it was determined that most variables violated assumptions of normality ($p=.001$), with the exception of the comprehension posttest and the vocabulary pretest scores ($p<.98$, $p<.24$, respectively). Given that most of the variables violated assumptions of normality and given the small sample size, nonparametric statistics were employed.

Primary Quantitative Analyses

In order to address the first research question (i.e. What are the effects of explicit teaching of morphemic analysis on vocabulary learning and comprehension?), gain scores were calculated to determine the amount of change between pre and post-intervention scores. These gain scores were then statistically examined using the Kendall's W test. This, like many non-parametric tests, uses the ranks of the data rather than their raw values to calculate the statistic. With this nonparametric statistical test, gain scores are ranked from low to high (regardless of direction). The ranks associated with negative differences are summed and the ranks associated with positive differences are summed. The statistical test is then computed. This analysis determines if the intervention had differential effects on students post test scores (i.e., it determines if the differences between pre and post test scores are statistically significant). Table 2 illustrates the results of these analyses for all variables. Results indicate that significant differences between pre and posttest scores in vocabulary and comprehension emerged.

Table 2

Statistical Analysis of Differences in Pre- and Posttest Scores

Variable	Kendall's W ^a	<i>p</i> value
Vocabulary (pre vs. post)	.552	.002*
Comprehension. (pre vs. post)	.254	.033*

Note. N=18, *=statistically significant, ^a Kendall's coefficient of concordance.

To address the second research question (i.e., Are the differences in outcomes based on reading status?), gain scores (post test minus pretest) were calculated to illustrate growth in vocabulary and comprehension knowledge following intervention. These gain scores were then statistically examined using the Kruskal Wallis test. This test is an alternative to the independent group analysis of variance (ANOVA), when the

assumption of normality or equality of variance is not met. This, like many non-parametric tests, uses the ranks of the data rather than their raw values to calculate the statistic. With this nonparametric statistical test, gain scores are ranked from low to high (regardless of direction). The ranks associated with negative differences are summed and the ranks associated with positive differences are summed. The statistical test was then computed. This analysis determined if the intervention had differential effects on students based on reading status. Results indicate that the students differed in performance on the vocabulary measure at pretest but not at posttest (see Table 3). Additionally, the groups differed in comprehension at pre and posttest. Finally, performance on the transfer test differed significantly based on reading status. In all cases, those who were identified by the researcher as a struggling reader performed more poorly on measures that did the typical readers.

Table 3

Statistical Differences Based on Reading Status

Variable	Chi Square	<i>p</i> value	Mean Ranks
Vocabulary pre	6.67	<i>p</i> <.01	11.5 (typical) 4.4 (struggling)
Vocabulary post	.26	<i>p</i> <.61	9.9 (typical) 8.6 (struggling)
Comprehension pre	10.40	<i>p</i> <.001	12.0 (typical) 3.0 (struggling)
Comprehension post	9.71	<i>p</i> <.002	11.9 (typical) 3.2 (struggling)
Transfer	8.58	<i>p</i> <.003	11.7 (typical) 3.8 (struggling)

Note. N=18. 5 struggling readers, 13 typical

Finally, to address the final research question (i.e., What are the transfer effects of morphemic analysis on novel words?) bivariate correlations (i.e., Spearman's rho)

between post-intervention morphemic analysis skills and accuracy on untrained words was computed. Results indicate that performance on the vocabulary posttest were not significantly related to performance on the transfer measure ($r=.134, p=.596$).

Primary Qualitative Data

Although formal qualitative analyses did not take place, additional qualitative data often supplement or enhance the quantitative findings. Interesting anecdotal recordings are reported.

Data for accurate journal recordings and the scaffolding effect were done each week for six weeks (see Table 4 in Appendix E). An accurate journal recording included completed affix, definition, four novel words provided by teacher and their definition, four novel words found in dictionary with appropriate affix and root, at least one created 'affixionary' word with a definition, and correct spelling of all. An 'x' was recorded if the student had accomplished the lesson task with no teacher assistance or correction. Students showed improvement each week as they were able to scaffold off teacher modeling and become more independent in their work. By week 3, 16 of the 18 students were able to work independently on the affix and root assignment accurately and all 18 students performed accurately at week 4. Week 5 and 6 each had 1 student with an inaccurate journal due to spelling mistakes on found dictionary words that had to be corrected.

Recordings were also made on student comments during the six weeks of intervention that had to do with transfer effects of morphemic analysis instruction (see Table 5 in Appendix F). These comments were recorded as students were reading on their own, with the class, or as they were working on different activities other than the specific

teaching of affixes. Of the 18 students, 4 showed transfer knowledge verbally when using morphemic analysis to get meaning from a novel word.

This investigator also took note of verbal attitude comments on and during the investigation (see Table 6 in Appendix G). These comments were again recorded during the six week intervention while working on the specific affix lessons. Ten of the 18 students were heard making positive comments about the intervention with 1 student making a negative comment. Most comments were recorded as students searched for words in the dictionary and created new ‘affixionary’ words of their own.

CHAPTER 5

CONCLUSIONS

Overview

The first goal of this study was to examine the effects of an intervention targeting morphemic analysis on vocabulary and comprehension skills by asking the following question: (a) What are the effects of explicit teaching of morphemic analysis on vocabulary learning and comprehension? It was hypothesized that, given the literature base, instruction in morphemic analysis would have positive effects on vocabulary and comprehension performance. Overall, the results provided support for this hypothesis. Expectations associated with the relations between the intervention and performance on vocabulary and comprehension measures were met.

The second goal of this study was to determine if there was a differential effect of the intervention based on certain student-level contextual factors (i.e., reading status) by asking the following question: (b) Are the differences in outcomes based on reading status?. It was hypothesized that there would be significant differences between typically developing readers and struggling readers. This hypothesis received support from these analyses. The one area in which the analyses did not support the hypothesis was in posttest vocabulary scores. Although they performed significantly differently at pretest, the intervention demonstrated a strong impact on vocabulary skills as the two groups did not differ significantly on the vocabulary posttest measure. This indicates that the intervention, although short-term in nature, was powerful enough to “bridge the gap” between typical and struggling readers in terms of vocabulary (as measured by the assessment tool).

Finally, the third goal of this study was to determine the transfer effects of instruction in morphemic analysis to novel, untrained words by asking the following question: (c) What are the transfer effects of morphemic analysis on novel words? Based on scant previous research, it was hypothesized that instruction in morphemic analysis would result in application of new knowledge to novel words. This hypothesis did not receive support from these analyses. Results indicated that performance on the vocabulary posttest (a proxy measure of the students' new knowledge) was not significantly related to performance on the transfer measure.

Effects of Morphemic Analysis Instruction on Vocabulary and Comprehension

It was hypothesized that instruction in morphemic analysis would have a positive impact on vocabulary and comprehension skills. This hypothesis received support from these analyses. Results indicated that vocabulary skills significantly improved following intervention. Additionally, comprehension skills significantly improved following the intervention. These results offer support to extant literature.

The NRP Report (2000) reported emphatically that two of its five components of reading had a strong correlation: comprehension and vocabulary. A strong vocabulary knowledge is directly related to comprehension of continually difficult types of text adolescents must read. Johns and Lenski (2005) said that the various strategies the reader applies as they process text will influence the depth of their understanding. Students must have a variety of strategies to draw upon when reading new text and vocabulary to understand what they are reading. Morphemic analysis proved to be a strategy that helped students understand the word and therefore comprehend the text they were reading.

The systematic teaching of vocabulary, in this case morphemic analysis, directly increases student comprehension as Stahl and Fairbanks (1986) also found in their research (as cited in Marzano, Pickering, and Pollock, 2001). Lehr, Osborn, and Hiebert (n.d.) estimated that sixty percent of the new words readers encounter have easily identifiable morphological structure. So studying the structural aspect of words makes sense. Students knowledge of word structure and all its meaningful parts (morphemes) is critical and once past the early elementary grades becomes important to the good reader's overall reading ability (Arendal, et al., 2001). As these sixth-grade students showed, being able to work with meaningful parts of new words helped them understand the word itself and therefore comprehend the text around the word.

Differences of Effects Based on Reading Status

It was hypothesized that there would be significant differences based on reading status and that struggling readers would show greater gains than grade level readers. This hypothesis received support from these analyses in all but the vocabulary posttest. It did not show significant differences between the struggling readers and the grade level readers as the struggling readers showed a much greater gain.

Research showed that gaps in vocabulary established in the early years only intensifies in later years. As cited in Tankersley (2005), "A high-performing first-grade student knows roughly twice as many words as the low-performing first-grade student, and the gap only increases over the years." Therefore, the struggling readers in this investigation were not expected to 'catch up' to their proficient classmates because of one intervention. All students were expected to improve on their scores with the differences in scores on pre and posttest remaining relatively the same. This turned out true for all

except the vocabulary posttest. Struggling readers improved enough on the posttest for there to not show significant differences between them and the grade level readers. The morphemic analysis intervention proved to be a better intervention tool for the struggling readers to significantly improve their vocabulary scores more than expected. This gives credit to what many researchers say about beginning intervention programs for struggling readers to break the cycle of low literacy before they get into high school (as cited in Paterson and Elliott, 2006).

Transfer Effects

It was hypothesized that instruction in morphemic analysis would result in application of new knowledge to novel words. This hypothesis did not receive support from the analyses in this study. One plausible explanation for this result could simply be attributed to the small sample size employed. Additionally, there appears to be restricted range, which would attenuate the correlation. To obtain significant external relations, ample variance is needed.

Also, although quantitative analyses did not indicate statistical relations, the data gathered qualitatively showed that some transfer did occur. Students verbal comments recorded showed evidence of student's ability to determine meaning of new words while reading by drawing their knowledge of the structural aspect of the words.

Though scant research has been found on transfer effects of morphemic analysis, the study by Baumann et. al (2002) did concur with this investigations qualitative results. Baumann et. al (2002) found evidence that transfer did occur when fifth-graders encountered novel words and had to determine meaning in vocabulary.

Educational Implications

This investigation proved that morphemic analysis has a definite effect on vocabulary learning. Struggling readers especially benefited from learning strategies that help them analyze new words they encounter. Being able to look at specific word parts (morphemes) and identify their meaning to help understand the word, gives struggling readers tools in which to tackle difficult text. Since vocabulary has a direct effect on comprehension, the improving of vocabulary can lead to an improvement in comprehension. With adolescent readers having to tackle exceedingly more difficult texts, teaching explicit strategies to derive meaning from unfamiliar words will benefit the reader in the understanding of those texts.

Limitations

Though the effects of morphemic analysis on vocabulary learning and comprehension showed statistical significance, it still can not be proven undeniably that vocabulary learning improves comprehension. Because vocabulary is learned both directly and indirectly, the precise relationship between vocabulary and comprehension can not be pin pointed. Additionally, the sample size in this study is a small one, perhaps limiting generalizability of results to other samples.

Future Research

Further investigation into the explicit teaching of morphemic analysis could look at the effects of a longer period of intervention. A six month investigation could be tested with a pre and post standardized test to see if the statistical significance would improve even more. Would comprehension growth be improved?

It would also be informative to see if the transfer effects would show any statistical difference with a longer period of time. How would transfer be effected when tested immediately and then at a later period in the investigation?

Another look into assessing transfer effects should be investigated also. Would another type of assessment or comparison of other data provide different results?

Finding the answers to all of these questions would further benefit students, especially struggling readers, in the explicit teaching of morphemic analysis to improve vocabulary learning and comprehension.

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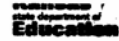
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APPENDICES

APPENDIX A

KSDE MORPHEMIC ANALYSIS ASSESSMENT



Student Name: _____

Date: _____

Teacher: Mrs. Ferguson

Vocabulary Test

Affixes and Root Words

Read each question below and circle the correct answer.

Read the following question(s) and circle the correct answer.

1. Knowing the meaning of the prefix *auto-* helps the reader understand that the word "autonavagation" means

- A. navigation again.
- B. the wrong navigation.
- C. navigation by itself.
- D. the study of navigation.

2. Knowing the meaning of the prefix *fore-* helps the reader understand that the word "foreground" means

- A. into the ground.
- B. the ground in front.
- C. after the ground.
- D. the study of ground.

3. Knowing the meaning of the prefix *multi-* helps the reader understand that the word "multisession" means

- A. many sessions.
- B. the same session.
- C. sessions together.
- D. the session before.

APPENDIX A (continued)

4. Knowing the meaning of the suffix *-ize* helps the reader understand that the word "crystallize" means

- A. made of crystals.
- B. the study of crystals.
- C. become like crystal.
- D. underneath a crystal.

5. Knowing the meaning of the suffix *-al* helps the reader understand that the word "frontal" means

- A. only the front.
- B. especially the front.
- C. under the front.
- D. relating to the front.

6. Knowing the meaning of the suffix *-ous* helps the reader understand that the word "fibrous" means

- A. before fibers.
- B. the most fibers.
- C. containing fibers.
- D. the study of fibers.

7. Knowing the meaning of the suffix *-some* helps the reader understand that the word "awesome" means

- A. losing awe.
 - B. very little awe.
 - C. feeling awe again.
 - D. having the quality of awe.
-

APPENDIX B

TRANSFER EFFECTS ASSESSMENT

Vocabulary Test
Affixes and Roots

Name _____

Date _____

Read each question below and circle the correct answer.

1. Knowing the meaning of the prefix *fore-* helps the reader understand the word "forefoot" means

- a. the study of the foot
- b. the foot in front
- c. in the foot
- d. on the foot

2. Knowing the meaning of the prefix *con-* helps the reader understand the word "condense" means

- a. to make denser
- b. the study of density
- c. having the quality of dense
- d. to make less dense

3. Knowing the meaning of the prefix *sub-* helps the reader understand the word "subhuman" means

- a. a human action
- b. many humans
- c. to join humans together
- d. less than human

4. Knowing the meaning of the prefix *multi-* helps the reader understand the word "multidimensional" means

- a. many dimensions
- b. the study of dimensions
- c. the same dimension
- d. the dimension before

5. Knowing the meaning of the prefix *auto-* helps the reader understand the word "autobiographer" means

- a. the study of biographers
- b. the wrong biographer
- c. biographer who writes about himself
- d. many biographers

APPENDIX B (continued)

6. Knowing the meaning of the suffix *-ous* helps the reader understand the word "blusterous" means

- a. losing bluster
- b. very little bluster
- c. having the quality of bluster
- d. full of bluster

7. Knowing the meaning of the suffix *-some* helps the reader understand the word "tiresome" means

- a. very little tire
- b. having the quality of tire
- c. the study of tire
- d. before tire

8. Knowing the meaning of the suffix *-ize* helps the reader understand the word "modernize" means

- a. to become modern
- b. the study of modern
- c. before modern
- d. less modern

9. Knowing the meaning of the suffix *-al* helps the reader understand the word "comical" means

- a. under the comic
- b. very little comic
- c. losing comic
- d. relating to the comic

10. Knowing the meaning of the suffix *-en* helps the reader understand the word "enlighten" means

- a. the study of light
- b. losing lighten
- c. to become lighten
- d. after lighten

APPENDIX C

MORPHEMIC ANALYSIS SAMPLE LESSON

VOCABULARY Prefixes, Suffixes, and Roots

(-al)

Suffix: -al

- * means: like; having the nature of; relating to
- * examples: natural; arrival; refusal; historical

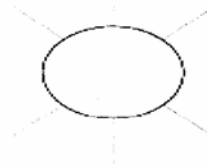
1. The flooded city was a **natural** disaster.
2. The little girl waited anxiously for her grandmother's **arrival**.
3. The witness's **refusal** to answer the question landed him in jail.
4. The **historical** marker was placed along the old Oregon Trail.

natural means: relating to nature

arrival means:

refusal means:

historical means:



Affixation:

My new word: **televisual**
It means: relating to television

APPENDIX D

STUDENT JOURNAL SAMPLE

Prefix: fore-

* means before; in front

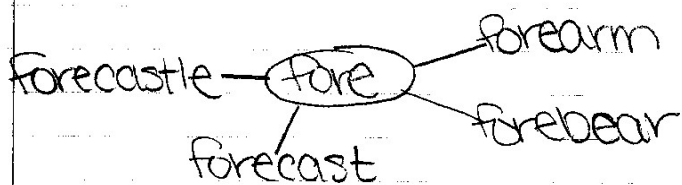
* examples: forerunner, foreleg
foreground; forefinger

Forerunner: runner who comes
before the others

Foreleg: the leg in front

Foreground: the scenery in front
of the rest

Forefinger: the first finger after
the thumb



Affixionary: my new word-

foreseat - the seat in the
front row

APPENDIX E

Table 4

Anecdotal Data for Accurate Journal Recordings and Scaffolding Effect

Student	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
1			x	x	x	x
2			x	x	x	x
3	x	x	x	x	x	x
4		x	x	x	x	x
5		x		x	x	x
6		x	x	x	x	x
7				x	x	x
8		x	x	x	x	x
9			x	x	x	x
10		x	x	x		x
11			x	x	x	x
12			x	x	x	x
13			x	x	x	x
14		x	x	x	x	
15		x	x	x	x	x
16		x	x	x	x	x
17	x	x	x	x	x	x
18		x	x	x	x	x

APPENDIX F

Table 5

Anecdotal Data of Transfer Effects to Novel Words

Student	Verbal Recording
1	
2	
3	“This word has con-. I know what that means.”
4	
5	
6	
7	“These spelling words have prefixes.”
8	
9	
10	
11	“This spelling page is easy. I already know most of the words ‘cause of the prefixes.”
12	
13	
14	“This word doesn’t work. There’s a suffix, but the word in front is not a real word.”
15	
16	
17	
18	

APPENDIX G

Table 6

Anecdotal Data of Attitude on Intervention

Student	Positive Comments	Negative Comments
1		"Not again."
2		
3		
4	"Here's a cool word."	
5		
6	"I want to read my new word."	
7	"Mrs. Ferguson. I bet you don't know this word."	
8	"I want to share my word."	
9		
10		
11	"My word is the longest."	
12	"Look at all the words I found that start with in-."	
13	"Let T.... share his word. It's cool!"	
14	"Mrs. Ferguson. Look at all the words I made."	
15	"Look at my new word. Is it good?"	
16		
17	"When are we going to share our new words?"	
18		