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## Teaching Community College Students Strategies for Learning Unknown Words as They Read Expository Text

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**Abstract:** An experiment was conducted to investigate methods that enable college students to learn the meaning of unknown words as they read discipline-specific academic text. Forty-one college students read specific passages aloud during three sessions. Participants were randomly assigned to three vocabulary learning interventions or a control condition. The interventions involved applying context, morphemic, and syntactic strategies; applying definitions; or applying both strategies and definitions to determine word meanings. Word learning and comprehension were measured during the interventions and in a transfer task to assess treatment effects on independent text reading. Results revealed that students in all three intervention groups outperformed controls in learning words and comprehending passages. However, the treatment groups did not differ from controls on the transfer task. Teaching both strategies and definitions was especially effective for learning unknown words and comprehending text containing those words.

**Keywords:** academic vocabulary learning; reading comprehension; college students; reading academic text; use of context; use of morphemic word parts; use of syntactic clues

### Introduction

“I have no clue!” replied one early childhood education student when asked to explain what was just read in the assigned textbook. Although the student demonstrated fluent oral reading of the passage, and had correctly located in the text the answer to a question about differing views of learning disability, the student showed no comprehension of what was just read. This interchange occurred in a class taught by the lead author, and the reaction is typical of many community college students taking courses whose textbooks are difficult to read. Students come to class without completing the assigned readings and are challenged when asked to read the material in class. This prompted the present research to investigate methods enabling community college students to access academic text.

### Overview of Community Colleges

Many students who attend community colleges are nontraditional students: they may be first-generation college students, students of low socio-economic status, minorities, immigrants, students needing remedial help, older students desiring to upgrade their employment opportunities, and students with learning disabilities (Dougherty & Townsend, 2006). As these students pursue their goals in college, one of their challenges is reading and comprehending information in textbooks. Macdonald-Ross and Scott (1997) found a strong correlation between

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reading ability and course completion. However, approximately 20% of first-year community college students enter with less than adequate reading skills (Falk-Ross, 2001). Additionally, according to data from the American Association of Community Colleges, only 36% of community college students obtain an associate's degree, only 13% of these attend a four year college, and of these, only 40% attain a degree there (American Association of Community Colleges, n.d.).

Without the ability to read and comprehend text, students' success is thwarted. One block to comprehension arises from limited knowledge of academic vocabulary terms. As Nagy (1988) stated, "One cannot understand text without knowing what most of the words mean" (p. 1). The purpose of the present study was to explore ways to improve college students' ability to learn the meaning of unknown words as they read academic text. Reading processes are differentiated for specific disciplines (Neal, 2015; Pearlman, 2013; Anderson & Kim, 2011; Shanahan, Shanahan, & Misichia, 2011). The discipline of interest in this study was education. It was expected that prospective teachers' ability to learn unknown words while reading passages from early childhood education texts would strengthen their reading comprehension of the texts.

### **Theoretical Framework and Review of Relevant Literature**

The basis for designing strategies that would help students learn unfamiliar words as they read was drawn from the theories of Chall (1983), Ehri (1998), Pressley and Afflerbach (1995), and Scarborough (2002), who offer detailed analyses of the components contributing to skilled reading. Based on Scarborough's component strands model, students need to acquire discipline-specific academic vocabulary, and they need to become familiar with the genre of expository text. Language comprehension processes need to become increasingly more strategic, word level strands need to become increasingly more automatic, and both of these processes need to become tightly interwoven in order for college students to comprehend challenging text (Scarborough, 2002).

According to Ehri's (1998) interactive model of reading, a central processing space allows readers to construct meaning by drawing from their background knowledge, linguistic knowledge, metacognitive strategies, memory for text, lexicon of written and spoken words, and knowledge of the writing system. Vocabulary and background knowledge were focal elements in the current study. When unfamiliar words are encountered in text, readers' comprehension is interrupted while they stop to figure out the word. They apply their knowledge of the writing system to pronounce the letters. They check their lexicon for a match to a known word. If no match is found, the word is regarded as a new vocabulary word. Various strategies might be applied to determine its meaning: examining other words in the passage for clues, inspecting morphological parts of the word, determining the function of the word in the sentence, or checking the dictionary definition. One or more sources help to clarify the word's meaning. As a result the spelling, pronunciation, and meaning of the new word are added to the reader's lexicon of known words. Several studies reviewed below examined effects of these strategies. In the current study, one or another of these strategies was taught to students, and the impact on word learning and reading comprehension was assessed.

Pressley and Afflerbach (1995) examined the processes that expert readers use as they read text. Students were instructed to think aloud as they read text. Pressley and Afflerbach showed that expert readers consciously construct meaning as they engage with text. Results revealed the use of context, morphology, syntax, and definitions; identification of domain specific words and unknown words; and meaning generation and evaluation. To investigate the merits of theories such as Pressley and Afflerbach's, Cromley and Wills (2014) used think aloud procedures to investigate the comprehension of 24 undergraduate students in a geology course.

These authors found that students who verbalized more background knowledge, important vocabulary, and high level strategy-use gained significantly more information from text than those students who verbalized less about the above components. Flexible use of high level strategies was also a hallmark of good comprehenders.

According to Chall's (1983) stage theory of reading, college students need to have acquired the mechanics of reading and passed through the reading-to-learn stage so that they are competent to understand multiple viewpoints and to critically analyze what they read. In the beginning of the reading-to-learn stage, readers first start to read for knowledge, especially in the content areas. Readers in this stage use prior knowledge to relate print to procedural knowledge, concrete information, and abstract ideas. Readers in this stage also need to focus on the meaning of words, especially academic vocabulary and abstract words. Some college professors may think that students have already developed skills in earlier grades, but in actuality, the need for continued development of content-area reading continues in college (Neal, 2015; Pearlman, 2013; Anderson & Kim, 2011). With the ability to integrate prior knowledge with ideas in print and the ability to understand domain-specific vocabulary, readers possess the necessary tools to become critical and analytical readers. Chall offers a stage theory which is similar to Ehri's (1998) theory. The advantage of Ehri's theory is that it is a more flexible framework with the potential to "serve researchers well for some time to come" (Beech 2005, p. 56).

A study of vocabulary development for post-secondary students is strongly needed given the lack of quality research in this area (Carlisle, 2010; Kelly, Lesaux, Kiefer, & Faller, 2010; Nist & Holschuh, 2002; Nist & Olejnik, 1995; Simpson & Randall, 2000). In its search for studies, the National Reading Panel (2000) found several surveys, case studies, and weak experimental designs lacking control groups and random assignment. There were few quality studies. Since then other studies have appeared, and some of this research is summarized below.

In their report on a program that helps prepare minority students from educationally disadvantaged backgrounds for the Medical College Admission Test (MCAT), Paul and Verhulst (2010) addressed students' need for an adequate vocabulary to support comprehension. Their program included vocabulary building assignments using context cues. Students who had taken the MCAT prior to participating in the program demonstrated significant gains on the MCAT after participation. A large majority of the participants (82% to 93% over 3 years) were accepted into at least one medical school.

Using structural equation modeling, Guo, Roehrig, and Williams (2011) investigated the relationships among vocabulary, morphological awareness, syntactic awareness, and reading comprehension. Gathering data from 151 English-speaking adults, the authors found that vocabulary knowledge played an important role in explaining individual differences in reading comprehension. Syntactic cues, morphological awareness, and context cues were especially helpful in learning vocabulary words during reading. The authors suggest that these vocabulary learning skills need to be part of instruction and curriculum design to support reading comprehension. Wilson-Fowler and Apel (2015) also offer support for morphological analysis. Using path analysis they found that morphological awareness was a moderate predictor of sentence comprehension among college students.

Taraban, Rynearson, and Kerr (2000) surveyed 1,149 college freshmen about their strategic reading skills. Two findings of interest were that nearly half of the respondents reported use of independent word learning skills and that this ability correlated positively with scores on the ACT English exam.

Hadley, Eisenwine, and Sanders (2005) used a nonexperimental design to investigate the effectiveness of an interactive reading intervention. Their goal was to increase the passing rate of college seniors on the Texas teacher certification exam. They hypothesized that students were having difficulty with the test because of poor reading skills, specifically lack of vocabulary. Drawing on the work of Pressley and Afflerbach (1995), the researchers guided 22 participants through word learning activities using naturalistic reading passages that were similar to passages on the exam. Upon completion of the intervention, students demonstrated increased ability to pass the exam.

Falk-Ross (2001) used a case study design to examine components of effective reading instruction. Four college students engaged in a variety of reading and writing activities. Of importance to the present study were the qualitative data that supported inclusion of morphemic analysis and teacher modeling as part of effective instruction.

The value of morphemic analysis and teacher modeling, as well as context cues and discussion, for word learning received support in a study by Kelly, Lesaux, Kiefer, and Faller (2010). Using a quasi-experimental design, they assessed the impact of vocabulary instruction that included these components on the comprehension of 476 students in an urban middle school. Students in the intervention group performed better than students in the control group on experimenter-designed tasks and on a standardized test. Two other studies also provided empirical support for the use of context, morphology, definitions, and teacher modeling with fifth graders (Baumann et al., 2002; Baumann, Edwards, Boland, Olejnik, & Kame'enui, 2003).

Fukkink and De Glopper (1998) conducted a meta-analysis of 21 studies. They found a significant, positive effect on students' ability to learn unknown vocabulary words when they were instructed to use context clues. In a meta-analysis by Stahl and Fairbanks (1986), significant effect sizes were reported on comprehension of vocabulary words taught and on comprehension measures in general. These studies plus many mentioned above were conducted with younger students. The current study extended this research to college students.

Because there are too many words to be taught explicitly by teachers in schools, students need to be taught intentional, strategic, and independent word-learning skills in order to build their vocabularies as they read text. The theories and research discussed above suggest the value of several components for teaching independent word learning. Instructor modeling with time for student practice and instructor feedback were found to be crucial components for student learning and engagement. Students need a repertoire of strategies that include the use of context cues, morphological analysis, and understanding of syntax. Teaching the application of definitions that are sufficiently elaborate (such as those in glossaries) during text reading is valuable. Students must learn to monitor their comprehension and to address problems when unfamiliar words create gaps in text meanings. Use of naturalistic texts would be expected to facilitate transfer of the strategies taught when students read on their own.

The present study investigated the effects of alternative vocabulary learning interventions and their impact on reading comprehension. A pretest-posttest experimental design was used. Participants were randomly assigned to one of four groups: (1) instruction in the use of strategies (Strategies group); (2) instruction in the application of definitions (Definitions group); (3) instruction in both strategies and definitions (Strategies plus Definitions group); and (4) Control group. Participants in the Strategies group were prompted to use contextual, morphological, and syntactical analysis to derive the meanings of vocabulary words appearing in the passages. Participants in the Definitions group applied researcher-supplied definitions to understand the meanings of vocabulary words in the passages. Participants in the Strategies plus Definitions

group used both methods to determine the meaning of vocabulary words. Participants in the Control group engaged only in a discussion of the passages. Definition, spelling recall, and reading comprehension were assessed following the interventions. The following questions were addressed: (1) Does instruction in strategy use, definition application, or a combination of both help community college students learn unknown words as they read expository text? (2) Will participants demonstrate increased use of strategies and/or definitions with practice? (3) Will these methods of word learning impact reading comprehension? (4) Will the word learning methods transfer and facilitate word learning when students read text independently?

## Method

### Participants

Students were recruited from the teacher education department of a large northeastern-U.S. public community college and provided informed consent to participate. They were at least 18 years old and were proficient in English as measured by a passing grade on the ACT test in reading and writing or successful completion of all remedial reading and writing courses. Students ranged in age from 18.9 to 60 years ( $M = 28.5$  years). There were 36 females and 5 males. Participants self-identified as follows: 5 black, 13 white, 10 Latino/Hispanic, 8 Asian/Pacific Islander, and 5 in two or more categories; 18 bilingual and 23 monolingual. The mean number of college credits completed was 33.6. Students were assigned randomly to four treatment groups. There were 48 participants who began the study. Seven dropped out midway, one from the Strategies plus Definition group and two from each of the other three groups. Characteristics by group are summarized in Table 1. Upon completion, students received a \$20 bookstore gift certificate.

Table 1. *Characteristics of the Four Instructional Groups*

	S+D <i>M (SD)</i>	S <i>M (SD)</i>	D <i>M (SD)</i>	Control <i>M (SD)</i>	<i>F(p)</i>
Age	32.69 (11.4)	24.36 (4.5)	24.44 (4.3)	31.99 (10.7)	2.99* (.04)
College Credits	37.27 (20.1)	38.30(14.0)	25.10 (14.0)	33.40 (22.0)	1.13 <i>ns</i> (.35)
Gender (F/M)	10/1	9/1	9/1	8/2	
Ethnicity					
White	3	1	0	1	
Black	3	1	5	4	
Latino/Hispanic	2	3	2	3	
Asian/Pacific Islander	0	3	3	2	
Other	3	2	0	0	
Mono/Bilingual	8/3	5/5	4/6	6/4	

Note. \* $p = .04$ ; *ns* not statistically significant. S+D = Strategies plus Definition group ( $N = 11$ ); S = Strategies Only group ( $N = 10$ ); D = Definition Only group ( $N = 10$ ); Control group ( $N = 10$ ). Degrees of freedom  $F(3,37)$ . *ns* not statistically significant at  $p < .05$ . \*--- $p$

### Materials and Procedures

**Vocabulary pretest.** Participants completed the 80-item multiple choice Vocabulary subtest of the Nelson-Denny Reading Test, Form G (Brown, Fishco, & Hanna, 1993). According to the manual, the KR-20 reliability for college students in the first 2 years is 0.94.

**Intervention passages.** Participants were trained and tested individually in three sessions. They were given content area passages to read aloud. The passages were drawn from textbooks and practitioner journals not used at this college. Passages contained target words that were not known to students based on field testing at this college. The first passage contained five target vocabulary words, and the other passages each contained seven target words. Passages covered topics on child development, the major field of study of the participants, and ranged from 140 to 343 words, with readability estimates ranging from 9.4 to 16.3, depending on the formula applied.

The first text was published in the practitioner journal *Young Children* and focused on the importance of play (Honig, 2007). The second text was obtained from a trade book published by Teachers' College Press and concerned the primacy of children's needs in curriculum planning (Ayers, 1995). The third text provided information about children's handwriting and was published in *American Educator* (Graham, 2010). The fourth text was used to assess transfer. It discussed scientific knowledge and was taken from *Child Development and Education* (McDevitt & Ormrod, 2009).

**Interventions.** Three vocabulary learning interventions were administered. The following procedures were common to all the treatments. During the first session, students read a passage orally and identified any unfamiliar words. Oral rather than silent reading was required to make sure that students read the complete text and processed all the words. Oral reading also allowed the researcher to "know which segment they were reacting to when they verbalized a thought" (Cromley & Wills, 2014, p.57). Then the researcher directed students' attention to the first target word and modeled the word learning procedure being taught. The researcher pointed to subsequent target words and coached students in applying the specific learning procedure for each word. During the second and third sessions, students applied the learning procedure independently and were coached when necessary. Errors were corrected, and re-modeling of the procedure was provided as needed. Participants were prompted to speak aloud their thought processes as they used the strategies and/or definitions. This think aloud was intended to expose students' use of strategies and/or definitions. Students' responses were recorded and the recorded responses were used for accuracy in scoring. When all of the target words had been treated in a passage, students read the passage aloud again. This was followed by posttests measuring what students had learned about the target words, including their definitions and spellings, and their comprehension of the passage. The specific learning procedures that were taught are described below:

**Strategies only treatment.** Students were provided with a chart that prompted them to use context, morphology, and syntax cues to discover the meaning of each target word as well as any other words identified as unknown:

For context: "Find other words in the text that help you understand this word."

For morphology: "How is this word or part of the word similar to other words you know?"

For syntax: "What is the function of this word in the sentence? Does this word name something, is it a noun, describe something, is it an adjective, or is it an action, a verb?"

The experimenter followed a script to guide students in understanding and applying these questions. She used modeling, scaffolding, prompting, and feedback to support students. The script offered alternatives dependent on students' responses. An example of modeling for the word *temperament* is given in Appendix A. Students were told to think aloud and reveal their thoughts as they were figuring out meanings. After applying the prompts, students were asked to deduce the meaning of the word. If students' meanings were incomplete, the experimenter

provided the missing information. The same procedures were applied to any nontarget words that the student had identified. Students were scored on the number of target words whose meanings were derived correctly and independently without the experimenter's help.

**Definition only treatment.** After reading each passage and identifying unknown words, students were shown a definition chart. One side of the page listed each target word. On the other side, an elaborated version of the word's dictionary definition was given. The experimenter pointed to each successive target word in the passage and told students, "Use the definition. What does the sentence mean?" The experimenter modeled the learning procedure with the first word in the first passage. This consisted of applying the definition to restate the sentence using words that demonstrated understanding of the target word's meaning in the sentence. For example, *temperament* was modeled in the following way.

What does *temperament* mean? The definition tells us that temperament means *inborn patterns of response, the way a person usually responds to situations*. So in the sentence: *Some children are slow and cautious in temperament while others tend to be more impulsive*, *temperament* means that some children have an inborn response in that they may be slow and cautious when responding to situations. This is how they respond in general to lots of situations. It is their typical reaction. Other children respond more quickly, more impulsively. This is their typical reaction. These are the words that I would use to help me understand the word *temperament* and to help me understand this sentence.

The experimenter encouraged students to verbalize their thoughts as they worked out their explanation. Errors and incomplete explanations were corrected. If students struggled, the experimenter modeled use of the definition to interpret the sentence's meaning. Students were credited with a correct explanation if they accurately and independently applied the definition to demonstrate understanding of a target word in its sentence.

**Strategies plus definition treatment.** The strategies procedures and definition procedures described above were combined in this intervention. For each target word, first students used the strategies of identifying context, morphology, and syntax cues to derive the word's meaning. The experimenter modeled, corrected errors, and provided feedback as needed. Then students were shown the word's definition and asked to compare the derived and supplied meanings. Then they applied both to understand the target word's meaning in the passage sentence. Again, the experimenter modeled, corrected errors, and provided feedback as needed. Students were credited with correct responses if they were produced accurately and without the experimenter's help. This was scored separately for strategy use and for definition application to sentence meanings.

**Control group.** The Control group received a different intervention unrelated to vocabulary instruction. Students read the treatment passages aloud once, identified unknown words, and then engaged in discussion guided by three tangential questions. For example, questions about the passage on play elicited memories about students' childhood in school. The experimenter provided written copies of the questions she presented orally, as well as additional prompts to engage students in the discussion. The students then read the passage orally again, and posttests were administered.

**Assessments during the interventions.** The intervention centered around students' reading of three passages. They read each passage aloud twice. After the first reading, students were asked to identify any words whose meanings were not known. This was followed by a vocabulary learning intervention or Control group discussion. Then students read the passage

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orally again. Any decoding errors were noted. Following this reading, several posttests were administered in the following order.

1. *Comprehension questions.* Students were presented with questions assessing their recall of information in each passage. The number of questions (Q) and number of possible responses (R) on each of the passages were 4 Qs, 15 Rs (1<sup>st</sup> passage); 4 Qs, 13 Rs (2<sup>nd</sup> passage); 5 Qs, 12 Rs (3<sup>rd</sup> passage); and 5 Qs, 12 Rs (4<sup>th</sup> passage). Students' oral responses were recorded and scored using a rubric. Comprehension rubrics consisted of comprehension prompts and or questions with acceptable answers. An example of a question and possible answers from the passage on play is as follows.  
Question: Tell me several ways that temperament affects children's play.  
Scoring Rubric (one point for each bullet)
  - Different temperaments cause children to respond to play in different ways.
  - Children with impulsive temperaments may have shorter attention spans during play.
  - Children may play for different durations of time
  - Children with slow and cautious temperaments or impulsive temperaments may need encouragement to become engaged in prolonged play.
2. *Cloze task.* Students were given the written passage with the first occurrences of the target words replaced by blank spaces. They were told to write in the missing words. To receive credit, the exact target word had to be recalled. Close approximations to correct spellings that were phonetic were accepted, for example, *temperment* for *temperament*. This task was regarded as measuring both vocabulary learning and reading comprehension.
3. *Spelling.* When vocabulary words are learned from text, spellings of the words enter memory along with pronunciations and meanings (Rosenthal & Ehri, 2008). Additionally, spelling is moderately correlated with sentence comprehension (Wilson-Fowler & Apel, 2015). To assess this aspect of vocabulary learning, students' memory for target spellings was assessed. The experimenter dictated the target words and students wrote them. The score was the number of correct spellings.
4. *Definition recall.* Students were shown each target word written on a card and were asked to define the word as it was used in the passage just read. The oral responses were recorded and scored according to a rubric. Definition rubrics consisted of the meaning of each target word as it was used in the passage. For example, in the passage on curriculum planning, the acceptable definition for the word *cast* was *to direct the eyes or a look toward somebody or something, often in a disapproving, or anxious manner*. Answers to definitions were marked as acceptable or unacceptable.
5. *Transfer task.* Students read the passage the first time silently and the second time aloud. No intervention occurred. The same posttests that were administered during intervention, were administered at the end of the transfer task.

**Scoring System.** Students' responses to comprehension and definition recalls during the interventions and on posttests were audio recorded and transcribed. These were used to develop rubrics distinguishing acceptable from unacceptable answers. Once developed, responses were rescored based on the rubrics. Responses to spelling and cloze were scored as noted above. Performance was evaluated by two researchers. Discrepancies were resolved through discussion and review of rubrics, audiotapes, and transcriptions.

## Results

### Characteristics of Participants

Students were pretested on measures that included the vocabulary subtest of the Nelson-Denny Reading Test, the percentage of words decoded correctly during the first reading of the first passage when instruction began, and the number of words identified as unknown after the first reading of the first text. Results of ANOVAs revealed no significant differences between the group means on these measures as shown in Table 2. Mean vocabulary scores on the Nelson-Denny test favored the Strategies plus Definition and the Control groups over the other groups, with large standard deviations showing substantial individual differences among students. On average, students' vocabulary scores were well below the mean of the normative sample:  $M = 64.52$ ,  $SD = 11.46$  (norm) versus  $M = 44.34$ ,  $SD = 19.87$  (present sample). Students decoded the passage at a high accuracy level ( $M = 98\%$ ). They identified fewer unknown words ( $M_s = 1$  to  $3.9$ ) than the number of targeted words (5) in this passage.

Table 2. Means, Standard Deviations, and Test Statistics of Instructional Groups on Pretests

Pretests	S + D	S	D	C	F(p)
Vocabulary Test	49.73 (20.5)	39.20 (21.3)	36.40 (14.1)	51.50 (21.1)	1.51 <i>ns</i> (.23)
Decoding Passage	98% (.02)	97% (.02)	97% (.01)	98% (.04)	1.23 <i>ns</i> (.31)
Words Unknown	1.09 (1.4)	3.10 (2.7)	3.90 (4.7)	1.30 (2.2)	2.21 <i>ns</i> (.10)

Note. S + D = Strategies plus Definition group ( $N = 11$ ); S = Strategies Only group ( $N = 10$ ); D = Definition Only group ( $N = 10$ ); Control group ( $N = 10$ ). Degrees of freedom  $F(3,37)$ . *ns* not statistically significant at  $p < .05$ .

ANOVAs were calculated to compare the treatment groups on age and number of college credits. Results revealed a significant main effect of age but no significant main effect of credits. From means in Table 1, it is apparent that the Strategies plus Definitions and Control groups were older and showed larger standard deviations than the Strategies and Definitions groups. However, post hoc comparisons between pairs of group means revealed no significant differences. Correlations calculated between age and pretest measures revealed no significant relationships, with all  $r_s < .28$ ,  $p > .05$ , indicating that age was not a relevant factor affecting the performance under study.

### Performance During the Interventions

Each of the three treatment sessions began with the student reading a passage aloud and then identifying any unknown words. Following the intervention plus a second reading of the passage, students completed several posttests assessing text comprehension, memory for spellings, and memory for definitions of the vocabulary words in that passage. At the end of the third session, students completed a transfer task without any intervention. They read a new passage once, identified any unfamiliar words, read the passage again, and then completed the same posttests.

Analyses comparing the treatment groups were conducted on treatment posttests separately from the transfer posttests. Because the groups differed on the Nelson-Denny vocabulary pretest, ANCOVAs were conducted with scores on this test as the covariate. The independent variables were treatment (four conditions) and passage (three intervention texts) in the ANCOVA on treatment passages. The independent variable in the ANCOVA on the transfer passage was treatment. The dependent variables were text comprehension assessed by answers

to questions and cloze, definition recall, and spelling memory. Mean performance is reported in Table 3 and results of the ANCOVAs are reported in Table 4.

Table 3. *Adjusted Mean Percentage Correct, Standard Deviations, and Effect Sizes During Training and Posttests as a Function of Treatment Condition*

Posttest	Treatment Passages		Transfer Passage	
	M (SD)	d <sup>a</sup>	M (SD)	d <sup>b</sup>
<i>Comprehension Questions</i>				
Strategy + Definitions (S+D)	.34 (.23)	1.12*	.48 (.36)	.03
Strategy (S)	.33 (.17)	1.29	.48 (.30)	.03
Definitions (D)	.33 (.19)	1.20	.47 (.26)	.00
Control	.15 (.11)		.47 (.31)	
<i>Cloze</i>				
Strategy + Definitions	.86 (.16)	2.00*	.29 (.24)	-.43
Strategy	.87 (.19)	1.90*	.32 (.17)	-.36
Definitions	.86 (.18)	1.90*	.33 (.23)	-.27
Control	.47 (.23)		.39 (.22)	
<i>Spelling</i>				
Strategy + Definitions	.91 (.09)	.73	.77 (.17)	.41
Strategy	.88 (.13)	.47	.69 (.25)	.10
Definitions	.90 (.15)	.56	.68 (.19)	.07
Control	.80 (.21)		.66 (.37)	
<i>Definition Recall</i>				
Strategy + Definitions	.62 (.25)	2.14*	.17 (.21)	-.42
Strategy	.36 (.24)	.95	.27 (.27)	.09
Definitions	.63 (.26)	2.19*	.23 (.24)	-.10
Control	.17 (.16)		.25 (.17)	
<i>Strategy Use</i>				
Strategy + Definitions	.65 (.22)	.38		
Strategy	.51 (.48)			
<i>Definitions Use</i>				
Strategy + Definitions	.66 (.22)	.67*		
Definitions	.53 (.17)			

Note. Number of students: 11 (S+D), 10 (S), 10 (D), 10 (C). \*p < .05 (See Table 4 for exact p values.)

<sup>a</sup>Cohen's effect size d = mean of treatment minus mean of control divided by pooled SD.

<sup>b</sup>Cohen's effect size d = mean of treatment on transfer text minus control mean divided by pooled SD.

<sup>c</sup>Proportion of target words whose meanings were figured out correctly by using context strategies.

<sup>d</sup>Proportion of target words used correctly to understand the words' use in sentences.

Table 4. *Results of ANCOVA Conducted on Posttests and Treatment Measures as a Function of Treatment Group and Reading Passages*

Source	df	MS	F	p	Partial Eta <sup>2</sup>	Paired Comparison
<b>Posttests</b>						
<i>Comprehension Questions on Treatment Passages</i>						
Treatment (T)	.3	.241	5.34	.004	.31	S+D > C
Error	36	.045				
Passage (P)	2	.028	1.61	.21	.04	
P × T	6	.030	1.74	.13	.13	

Error	72	.018				
<b>Comprehension Questions on Transfer Passages</b>						
Treatment (T)	3	.000	0.00	1.00	.00	
Error	36	.078				
<b>Cloze on Treatment Passages</b>						
Treatment (T)	3	1.095	17.45	.00	.59	S+D > C
Error	36	0.63				S > C
Passage (P)	2	.005	0.26	.78	.01	D > C
P x T	6	.052	2.47	.03	.17	
Error	72	.021				
<b>Cloze on Transfer Passages</b>						
Treatment (T)	3	.018	0.40	.75	.03	
Error	36	.044				
<b>Spelling on Treatment Passages</b>						
Treatment (T)	3	.072	2.05	.12	.15	
Error	36	.035				
Passage (P)	2	.017	1.07	.35	.03	
P x T	6	.01	0.56	.76	.05	
Error	72	.016				
<b>Spelling on Transfer Passages</b>						
Treatment (T)	3	.021	0.43	.73	.04	
Error	36	.048				
<b>Definition Recall on Treatment Passages</b>						
Treatment (T)	3	1.473	15.42	.00	.56	S+D > S, C
Error	36	.096				D > S, C
Passage (P)	2	.043	1.41	.25	.04	
P x T	6	.051	1.68	.14	.12	
Error	72	.030				
<b>Definition Recall on Transfer Passage</b>						
Treatment (T)	3	.021	0.54	.66	.04	
Error	36	.039				
<b>During Treatments</b>						
<b>Strategy Use – Comparison of S+D vs. S Treatment</b>						
Treatment (T)	1	.297	3.66	.07	1.69	
Error	18	.081				
Passage (P)	2	0.60	1.42	.26	.07	
P x T	2	.006	0.14	.87	.01	
Error	36	.042				
<b>Definition Use – Comparison of S+D vs. D Treatment</b>						
Treatment (T)	1	.253	5.68	.03	.24	S+D > D
Error	18	.045				
Passage (P)	2	.161	5.16	.01	.22	
P x T	2	.162	5.20	.01	.22	
Error	36	.031				

<sup>a</sup>S+D = Strategies plus Definitions treatment; S = Strategies Only treatment; D = Definitions Only treatment; C = Control treatment. Bonferroni correction for multiple pairwise comparisons.

**Comprehension.** In the first posttest on each passage, students gave oral answers to questions tapping their recall of passage information. Because the numbers of questions and correct answers differed across passages, scores were converted to percentages. Results of the ANCOVA showed a significant main effect of treatment but no effect of passage and no interaction (see Table 4). Bonferroni pairwise comparisons revealed that the Strategies plus Definition group comprehended the text significantly better than the Control group but differences favoring the other treatment groups over controls fell short of significance. Cohen's effect sizes reported in

Table 3, however, indicate large differences favoring all three treatment groups over controls ( $d$ s ranging from 1.12 to 1.29) in their comprehension of the treatment texts.

Superior comprehension of the texts was evident also in performance on the cloze task requiring students to fill in the missing vocabulary words as they reread the text. Results of the ANCOVA revealed a significant main effect of treatment and a significant interaction between treatment and passage but no main effect of passage (see Table 4). Bonferroni tests showed that all three treatment groups significantly outperformed the Control group but did not differ from each other. Inspection of mean performance across the three passages revealed the source of the interaction. Whereas the three treatment groups performed very similarly with means across passages ranging from 81% to 92% correct, the Control group means were more variable:  $M$ s = 35% (1<sup>st</sup> text), 67% (2<sup>nd</sup> text), 40% (3<sup>rd</sup> text). Why this happened is not clear. From these results we conclude that the vocabulary interventions helped students learn the vocabulary words and comprehend the text better than the non-vocabulary control intervention.

At the end of the intervention students read a text independently to determine whether they might apply the strategies taught. As shown in Tables 3 and 4, the treatment groups performed no better than controls on the two comprehension measures involving questions and cloze. Effect sizes were close to zero.

**Spelling.** The ANCOVA revealed no significant main effects or interactions on the posttest assessing students' memory for the spellings of vocabulary words that the treatment groups had studied during the interventions (see Table 4). As evident in Table 3 students recalled many of the words, with the control group remembering 80% correct on average, a value close to the means of the treatment groups ranging from 88% to 91%. This suggests that the closer attention paid to the vocabulary words during the treatments did not enhance memory for the words' spellings. On the spelling transfer task, no significant differences between groups were observed (see Tables 3 and 4).

**Definition recall.** As shown in Table 4, the ANCOVA revealed a significant main effect of treatment on the measure of recalling definitions of the vocabulary words, but no effect of passage and no interaction. Bonferroni tests indicated that both the Strategies plus Definition and the Definition Only groups significantly outperformed the Strategies group and the Control group but did not differ from each other. This no doubt arose because both of these groups were provided with explicit definitions of the words whereas the strategies group had to figure out the meanings of words using morphological, syntactic, and contextual cues but never saw definitions, and the Control group paid no special attention to meanings but just read the passages. Seeing and applying definitions to the text produced a big jump in definition recall scores. When students worked with definitions, they recalled on average 62% to 63% of the words' meanings and showed very large effect sizes of  $d = 2.14$  (Strategies plus Definitions group) and  $d = 2.19$  (Definitions group). When students used cues to induce word meanings, they recalled only 36% of the definitions on average but substantially more than the Control group mean of 17%, with a large effect size ( $d = 0.95$ ).

The ANCOVA of transfer task performance revealed no significant main effect of treatment, indicating that word learning strategies were not utilized when participants read text independently. In fact, the two groups who had been provided with definitions during training did slightly worse than the Strategies and Control groups on definition recall (see Table 3). Since definitions were not provided on the transfer task, it was not possible to use the definition application strategy.

The pattern of definition recall favoring the Strategies plus Definition and the Definition Only groups over the other two groups was examined for individual words in the treatment passages (see list of words in Appendix B). In every case but two out of 19 words total, students who were taught to apply explicit definitions recalled more definitions than students who were not given definitions. These results show that findings generalized across words as well as students.

**Strategy use during the interventions.** Two of the treatment groups (Strategies plus Definitions and Strategies) were taught to use strategies to determine the meanings of the target words. These included using context, morphological, and syntactic cues. The score was the number of times that students applied strategies to correctly and independently explain the meanings of vocabulary words. An ANCOVA applied to performance of the two groups revealed no significant main effects or interaction involving treatment and passage variables (see Table 4). Although mean performance favored the Strategies plus Definitions group (see Table 3), the difference fell short of significant ( $p = .07$ ). These findings show that both groups were able to apply this strategy to figure out over half of the words' meanings on average.

**Definition use during the intervention.** Two of the treatment groups were provided with definitions of the target words and applied them to explain the meanings of the words in their sentence contexts. Students' explanations were scored using a rubric requiring inclusion of all the components of the definition. Results of the ANCOVA revealed significant main effects of treatment and passage and a significant interaction (see Table 4). Regarding the source of the interaction, means showed that performance of the Strategies plus Definitions group and the Definitions group were similar on the first passage ( $M_s = 52\%$  and  $48\%$  correct, respectively). On the second passage the Strategies plus Definitions group mean rose to  $75\%$  while the Definitions group mean declined to  $39\%$ . On the third passage, both means were again very similar ( $72\%$  for Strategies plus Definitions and  $70\%$  for Definitions). This suggests that the Definitions group took longer to learn to apply definitions when interpreting words in their contexts than the Strategies plus Definitions group. Receiving both strategies and definition training provided an early boost to students' ability to apply definitions to understand their meanings in context.

**Unknown word identification.** After reading each passage aloud for the first time, students pointed out words whose meanings they did not know. Relatively few words were identified in each passage with several students identifying no words. The number of words was summed across the four passages (26 maximum) and subjected to an ANCOVA with Nelson-Denny vocabulary scores as the covariate. Results revealed no main effect of treatment,  $F(3,36) = 1.66$ ,  $p = .19$ ,  $M = 10.51$  ( $SD = 10.4$ ). The covariate was significantly related to scores ( $p = .003$ ). The correlation between Nelson-Denny vocabulary scores and the number of unknown words identified was  $r = -.53$ ,  $p < .001$ , indicating that students with larger vocabularies identified fewer unknown words. The fact that students identified as unfamiliar no more than  $40\%$  of the words on average was an unexpected finding. On the transfer task posttest when no definitions had been studied, students were able to define no more than  $23\%$  of the words on average, indicating low knowledge of word meanings. Perhaps students felt they had some knowledge of the words, having just read them in the treatment passages. Perhaps they knew other meanings of polysemous words such as *cast*. These findings suggest that students may need training to become aware of words whose meanings are unfamiliar.

**Performance during sessions.** Some additional measures were recorded during the training sessions. Students' word reading accuracy during the second reading of the passages was examined. Mean performance of the four groups on each of the four passages was very high ranging from  $97.3\%$  to  $99.4\%$  correct except in one case where the Control group read the third

passage at 90% accuracy. This shows that students did not have difficulty reading these passages. Hence differences in reading accuracy did not explain any differences on the posttests.

The duration of the three sessions was recorded for each student. An ANOVA applied to minutes revealed no main effect of treatment group,  $F(3,37) = 1.57, p > .05$ . Sessions ranged from 40 to 54 minutes on average. This indicates that any differences produced by the treatments on posttests did not arise from greater time in training.

Anecdotal comments from individual students revealed some effects of the treatments. During interventions, some participants in the Strategies group and the Strategies plus Definitions group commented that they related some words to cognates in their native language. For example, they identified *facilitate* with *facil*, Spanish for easy. Some participants in the Definitions group remarked that they liked the definitions that were provided better than dictionary definitions, because sometimes there were too many definitions in the dictionary, and sometimes these definitions did not make sense to them. Some participants in the Strategies plus Definitions group stated that examining the context first made it easier to understand the definitions when they were subsequently provided, thus revealing the advantage of processing both sources of information. Several participants in the Strategies plus Definitions group were excited when their use of strategies yielded a result similar to the supplied definition. Some participants in the intervention groups came to the second and third sessions with reports of using the strategies while completing assigned readings in their courses. Some asked why these methods were not taught all the time. Others stated that they would now pay attention to and use the definitions given in their textbooks and wished that all textbooks had definitions.

When students were unable to attend a session, they expressed their eagerness to reschedule. When participants completed the three sessions, many asked if they could continue with more sessions or contact the researcher if they needed further assistance. These examples reveal that participants valued the interventions.

**Correlations.** Pearson product moment correlations were calculated to assess relationships between the various pretest and posttest measures. Results presented in Table 5 show that performance on the Nelson-Denny vocabulary test was negatively related to the number of words identified as unknown in passages, as noted previously. This provides some validity for our task of asking students to identify unknown words, by showing that those with lower vocabulary scores identified more unknown words. Nelson-Denny vocabulary scores were positively correlated with all the posttest scores, indicating the benefit of having a larger vocabulary for learning new words. The correlation was especially strong between vocabulary and students' memory for the spellings of target words, possibly because the Nelson-Denny vocabulary test required selecting written word answers. This is consistent with other studies showing a strong relationship between vocabulary and spelling ability (Wilson-Fowler & Apel, 2015; Stanovich & Cunningham, 1992). Lower correlations between Nelson-Denny vocabulary scores and the cloze and definition recall posttests may have resulted from the strong influence of the vocabulary learning treatments on performance in these tasks. Very likely the interventions severely reduced the impact of individual differences in vocabulary knowledge on these posttest measures.

The four posttests were positively correlated. The fact that the cloze test was strongly correlated with both comprehension question and definition recall tests ( $r_s = .54$  and  $.68$ , respectively) indicates that the cloze task assessed both comprehension and vocabulary in support of the interpretation of cloze performance by Greene (2001) and Simpson and Randall (2000). The correlation between cloze and vocabulary is not surprising, since students were

required to fill in the blanks with the target vocabulary words that were taught. The strong relationship between cloze and spelling most likely arose because students had to write the words in the cloze task. Spelling was less strongly correlated with the oral tasks involving comprehension questions and definition recall.

Table 5. *Correlations Between Tests (N = 41)*

	1	2	3	4	5	6
Nelson-Denny Vocabulary Pretest						
Unknown Words Identified	-.53**					
Comprehension Questions	.38*	-.01				
Cloze	.25	-.12	.54**			
Spelling	.51**	-.15	.37*	.48**		
Definition Recall	.30	-.11	.61**	.68**	.29	
<i>M</i>	44.34	10.51	14.66	17.00	21.71	10.39
<i>SD</i>	19.87	10.41	7.01	4.56	3.77	5.50

*Note.* \* $p < .05$ ; \*\* $p < .01$ . Scores on posttests are summed across the four passages.

## Discussion

The present study explored alternative methods to help community college students learn unknown words as they read discipline-specific academic text. Two questions addressed were whether vocabulary learning treatments would enhance memory for the meanings of the words studied and whether this would facilitate reading comprehension of the text containing the words compared to performance of a control group. Results were positive. Effect sizes were large or very large on the posttests assessing comprehension with questions, cloze, and definition recall. Of additional interest was whether effects of the word learning procedures would improve with practice and would be evident on a transfer task where participants read text independently. Results were not supportive. The mean percentage of correct responses did not increase from the first to the third treatment session. On the final transfer passage, none of the treatment groups outperformed the Control group. Effect sizes were close to zero or negative on the comprehension questions, cloze, and definition recall posttests.

The most effective way for students to establish the meanings of target words in memory was to be provided with explicit definitions. Effect sizes favoring the Definitions and the Strategies plus Definitions groups over the Control group on the definition recall posttest were very large with  $d$ s  $> 2.00$ . Less effective for definition recall was the procedure of teaching students to figure out meanings of target words by using morphological, syntactic, and contextual cues. However, this procedure did yield a large effect size, with  $d = 0.95$ , indicating that it boosted memory for meanings compared to controls. Recall may have been diminished because the strategy procedure never showed students complete, written definitions. Definitions were induced and expressed orally with the experimenter adding any information left out by students. Although students receiving the strategies plus definitions treatment were taught both strategies and explicit definitions, adding the strategies procedure did not enhance memory for definitions over that of teaching definitions but no strategies. Effect sizes were very similar. This indicates that memory for definitions on the posttest arose primarily from exposure to explicit definitions. Further support was evident on the transfer task where explicit definitions were not provided and students who had received vocabulary learning treatments defined many fewer words, with no differences between groups.

Findings are similar to the results found by Baumann, Edwards, Boland, Olejnik, and Kame'enui (2003). In that study participants were assigned to a Text Book Vocabulary group or a Strategies group; participants in the Text Book Vocabulary group outperformed participants in the Strategies group on the vocabulary posttest. With more training and a larger sample size, significance may have been reached for the Strategies group over the Control group in the present study. The Baumann et al. (2003) study did find that students were able to use the context and morphological strategies to learn words when context supported word learning or affixes had been taught. However, that study included a much longer training period (thirty 45-minute lessons).

The vocabulary learning procedures also enhanced students' reading comprehension of the treatment passages compared to a control condition where the words were read in text but their meanings were not analyzed. Two measures of comprehension, on the cloze and the question tasks, showed effect sizes ranging from large to very large ( $d$ s from 1.12 to 2.00). All three treatments produced equivalent effects. These results reveal that students' comprehension of academic text can be enhanced when reading is enriched either by applying strategies to figure out meanings of unfamiliar words, by applying definitions of unfamiliar words to analyze their meanings in sentences in the text, or by applying both procedures. In contrast, on the transfer task when students read a passage independently without being prompted to analyze word meanings, comprehension was not boosted above that of control students.

Although students in the treatment groups are likely to have examined the spellings of target words more than control students as a result of analyzing their meanings, their memory for spellings of the words did not differ statistically from controls. However, effect sizes suggested a moderate advantage of vocabulary training, with  $d$ s ranging from .47 to .73. Differences may have been suppressed by ceiling effects, as all the groups spelled 80% to 91% of the target words correctly on average. Although greater exposure to spellings of the words during vocabulary learning did not affect spelling memory, correlations revealed that vocabulary knowledge affected spelling memory. Students with larger vocabularies spelled more words correctly than students with weaker vocabularies, with  $r = .51$ . Among adults, larger vocabularies may arise from greater exposure to printed words in text, which enhances students' knowledge of the morphological and orthographic structure of written words (Ocal & Ehri, 2017; Stanovich & Cunningham, 1992). This in turn helps students remember the spellings of new words (Ehri, 1998).

During the treatments students' use of the vocabulary learning procedures to respond correctly and independently was monitored, and the groups taught the procedures were compared. Use of the strategy of figuring out meanings from morphological, syntactic, and context cues did not distinguish the Strategies plus Definitions group from the Strategies group statistically, although the mean of the former group was somewhat higher. Similar performance may have resulted from the fact that students in the Strategies plus Definitions group applied the strategy procedure to figure out target word meanings first, before they were shown explicit definitions. So, they gained no advantage over the Strategies group from the definition application procedure at this point in the treatment. In contrast, the Strategies plus Definitions group significantly outperformed the Definitions group in applying explicit definitions of the target words to explain their meanings in sentences. Superior performance was evident only during the second treatment session, when the Strategies plus Definitions group's mean performance increased much more than the Definitions group from a low level during the first session to a high level in the third session. The two groups performed similarly during the first and third sessions. One possible explanation for the earlier gain of the Strategies plus Definitions group is that, as a result of having already analyzed context cues for word meanings, they required less practice to attain skill in applying explicit definitions to explain word meanings in sentences. An alternative

possibility is that the specific text read during the second session produced the difference. These possibilities await further study.

After they read the treatment passages once, students were asked to point out words whose meanings were unfamiliar. Students were not very good at this, suggesting that they may need training to become aware of how much or little they know about the meanings of words. This is an important direction for future research. Very likely, the first step required of students in building their vocabularies independently as they read text is noticing unfamiliar words. The second step is doing something about it, particularly when this information is needed to understand the text.

### **Educational Implications**

Many community colleges offer tutoring support for students. The training examined in the current study provides evidence for effective methods to utilize with students in one-on-one tutoring sessions. Word learning included multiple word identities, pronunciations, spellings, and meanings, in accordance with Ehri's (1998) connectionist theory of word learning. Words were learned in context as proposed by Simpson and Randall (2000) and Whitt (1993). Consistent with Pressley and Afflerbach's (1995) theory of consciously constructive readers, participants were engaged in tasks that required active engagement with the text. Participants benefited from modeling, coaching, and support from an expert reader as they learned a limited but flexible use of strategies. While Pressley and Afflerbach would propose a more extensive use of strategies, the strategies used here were in accordance with the scope of this study.

Current findings supported the importance of providing students with training in sensitivity to unknown words, use of a glossary containing elaborated definitions that are more informative than dictionary definitions, and strategies such as context clues, morphological cues, and syntactic cues. The current training consisted of instructor modeling, student oral participation, and instructor coaching and feedback. Findings also supported the inclusion of glossary definitions in textbooks. Encouraging students to use glossary definitions in relation to text content provides access to word meanings and, as a result, impacts comprehension. Qualitative analysis of performance indicated that participants in the intervention groups found the strategies, definitions, and time spent reading with the researcher useful not only for building their academic vocabularies and comprehending text during the sessions but also in their college course work. Maintaining a positive attitude to academic reading should prove beneficial to students as they progress through their college careers (Datta & Macdonald-Ross, 2002; Macdonald-Ross & Scott, 1997).

Future research might investigate the use of strategy training and elaborated definitions with small groups or whole classes. Activation of background knowledge, explication of the grammatical features of academic text, and flexible use of strategies are other considerations for future research (Cromley & Wills, 2014; Neal, 2015). In the study reported here, participants engaged in three training sessions. There was extensive modeling for the first word in the first session. After that participants were directed to use the strategies independently with coaching and feedback as needed. Future studies might utilize more instructor modeling and continue for more than three sessions. This may allow more thorough learning of skills and facilitate transfer to independent reading. Delayed testing also needs to be investigated to determine the long term effects of word learning and increased comprehension. In the Kelly, Lesaux, Kiefer, and Faller (2010) study, participants engaged in training for 18 weeks. Other studies reported improvement after semester-long work (Hadley, Eisenwine, & Sanders, 2005; Falk-Ross, 2001). Baumann et al. (2003) investigated the use of context-plus-morphology and definitions separately with fifth

grade students. The current study investigated a combination of these methods with community college students. Research could be extended to use of the combined methods with middle school and high school aged children, various age groups of adult learners, bilingual students, and English language learners.

While this study was limited in its scope, it does provide support for the use of specific methods to help community college students access academic text. With the current political focus on the importance of community colleges, methods that enable students to succeed are needed (Kolesnikova, 2009). As Pugh, Pawan, and Antommarchi (2000) have noted, "Reading is the platform from which critical thinking, problem solving and effective expression are launched ... Literacy is the means by which postsecondary learners can achieve success" (pp. 25–26).

## References

- American Association of Community Colleges. (n.d.). *Degree attainment*. Retrieved July 13, 2015, from <http://www.aacc.nche.edu/AboutCC/Trends/Pages/degreeattainment.aspx>
- Anderson, T., & Kim, J. Y. (2011). Strengthening college students' success through the RAC. *Journal of College Reading and Learning*, 42(1), 61–78. <https://doi.org/10.1080/10790195.2011.10850348> [GS Search](#)
- Ayers, W. (1995). *To become a teacher: Making a difference in children's lives*. New York: Teachers' College Press.
- Baumann, J.F., Edwards, E.C., Boland, E.M., Olejnik, S., & Kame'enui, E.J. (2003). Vocabulary tricks: Effects of instruction in morphology and context on fifth-grade students' ability to derive and infer word meanings. *American Educational Research Journal*, 40(2), 447–494. <https://doi.org/10.3102/00028312040002447> [GS Search](#)
- Baumann, J. F., Edwards, E. C., Font, G., Tereshinski, C. A., Kame'enui, E. J., & Olejnik, S. (2002). Teaching morphemic and contextual analysis to fifth grade students. *Reading Research Quarterly*, 37(2), 150–176. <https://doi.org/10.1598/RRQ.37.2.3> [GS Search](#)
- Beech, J. R. (2005). Ehri's model of phases of learning to read: A brief critique. *Journal of Research in Reading*, 28(1), 50–58. <https://doi.org/10.1111/j.1467-9817.2005.00252.x> [GS Search](#)
- Brown, J. I., Fishco, V. V., & Hanna, G. (1993). *Nelson-Denny reading test: Technical report, forms G&H*. Chicago, IL: Riverside Publishing Company.
- Carlisle, J. F. (2010). Effects of instruction in morphological awareness on literacy achievement: An integrative review. *Reading Research Quarterly*, 45(4), 464–524. <https://doi.org/10.1598/RRQ.45.4.5> [GS Search](#)
- Chall, J. (1983). A proposal for reading stages. In J. Chall, *Stages of reading development* (pp. 9–39). New York: McGraw Hill.
- Cromley, J. G., & Wills, T. W. (2014). Flexible strategy use by students who learn much versus little from text: Transitions within think-aloud protocols. *Journal of Research in Reading*, 39(1), 50–71. <https://doi.org/10.1111/1467-9817.12026> [GS Search](#)
- Datta, S., & Macdonald-Ross, M. (2002). Reading skills and reading habits: A study of Open University undergraduate reserves. *Open Learning*, 17(1), 68–88. <https://doi.org/10.1080/02680510120110193> [GS Search](#)

- Dougherty, K. J., & Townsend, B. K. (2006). Community college missions: A theoretical and historical perspective. *New Directions for Community Colleges*, 136 (5–13). <https://doi.org/10.1002/cc.254> [GS Search](#)
- Ehri, L. C. (1998). Grapheme-phoneme knowledge is essential for learning to read words in English. In J. L. Metsala & L. C. Ehri (Eds.), *Word Recognition in Beginning Literacy* (pp. 3–40). Mahwah, NJ: Lawrence Erlbaum Associates, Inc. [GS Search](#)
- Falk-Ross, F. C. (2001). Toward the new literacy: Changes in college students' reading comprehension strategies following reading/writing projects. *Journal of Adolescent & Adult Literacy*, 45(4), 278–288. [GS Search](#)
- Fukkink, R. G., & de Gloppe, K. (1998). Effects of instruction in deriving word meaning from context: A meta-analysis. *Review of Educational Research*, 68(4), 450–469. <https://doi.org/10.3102/00346543068004450> [GS Search](#)
- Graham, S. (2010, Winter). Want to improve children's writing? Don't neglect their handwriting. *American Educator*, 33(4), 20–23.
- Greene, B. (2001). Testing reading comprehension of theoretical discourse with cloze. *Journal of Research in Reading*, 24(1), 82–98. <https://doi.org/10.1111/1467-9817.00134> [GS Search](#)
- Guo, Y., Roehrig, A. D., & Williams, R. S. (2011). The relationship of morphological awareness and syntactic awareness to adult's reading comprehension: Is vocabulary a mediating factor? *Journal of Literacy Research*, 43(2), 159–183. <https://doi.org/10.1177/1086296X11403086> [GS Search](#)
- Hadley, N. J., Eisenwine, M. J., & Sanders, M. G. (2005). Teaching reading strategies to adult learners: An interactive approach addressing standardized testing. *Curriculum and Teaching Dialogue*, 7, 65–78. [GS Search](#)
- Honig, A. S. (2007). Play: Ten power boosts for children's early learning. *Young Children*, 62(5), 72–78. [GS Search](#)
- Kelly, J. G., Lesaux, N. K., Kiefer, M. J., & Faller, E. (2010). Effective academic vocabulary instruction in the urban middle school. *The Reading Teacher*, 64(1), 5–10. <https://doi.org/10.1598/RT.64.1.1> [GS Search](#)
- Kolesnikova, N. A. (2009, Fall). The changing role of community colleges. *Bridges*. Retrieved from <https://www.stlouisfed.org/publications/bridges/fall-2009/the-changing-role-of-community-colleges>
- McDevitt, T., & Ormrod, J. (2009). *Child development and education* (4th ed.). New York: Pearson. [GS Search](#)
- Macdonald-Ross, M. & Scott, B. (1997). A postal survey of OU students' reading skills. *Open Learning*, 12(2), 29–40. <https://doi.org/10.1080/0268051970120204> [GS Search](#)
- Nagy, W. E. (1988). *Teaching vocabulary to improve reading comprehension*. Urbana, IL: ERIC Clearinghouse on Reading and Communication Skills. [GS Search](#)
- National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction* (NIH Publication No. 00-4754). Washington, DC: National.
- Neal, H. N. (2015). Theory to practice: Cultivating academic language proficiency in developmental reading classrooms. *Journal of Developmental Education*, 39(1) 12–34. [GS Search](#)
-

- Nist, S. L., & Holschuh, J. L. (2000). Comprehension strategies at the college level. In R. F. Flippo & D. C. Caverly (Eds.), *Handbook of College Reading and Study Strategy Research* (pp. 25–42). Mahwah, NJ: Lawrence Erlbaum Associates.
- Nist, S., & Olejnik, S. (1995). The role of context and dictionary definitions on varying levels of word knowledge. *Reading Research Quarterly*, 30(2), 172–193. <https://doi.org/10.2307/748031> [GS Scholar](#)
- Ocal, T., & Ehri, L. (2017). Spelling ability in college students predicted by decoding, print exposure, and vocabulary. *Journal of College Reading and Learning*, 47(1), 58–74. <https://doi.org/10.1080/10790195.2016.1219242> [GS Search](#)
- Paul, G. & Verhulst, S. (2010). Improving the reading comprehension skills of adults from educationally disadvantaged backgrounds. *Journal of Adolescent and Adult Literacy*, 54(2), 131–140. <https://doi.org/10.1598/JAAL.54.2.5> [GS Search](#)
- Pearlman, S. J. (2013, December 11). It's not that they can't read; It's that they can't read: Can we create "citizen experts" through interactive assessment? *Across the Disciplines*, 10(4). Retrieved from: <https://wac.colostate.edu/atd/reading/pearlman.cfm> [GS Search](#)
- Pressley, M., & Afflerbach, P. (1995). *Verbal protocols of reading: The nature of constructively responsive reading*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc. [GS Search](#)
- Pugh, S., Pawan, F., & Antommarchi, C. (2000). Academic literacy and the new college learner. In R. F. Flippo & D. C. Caverly (Eds.), *Handbook of College Reading and Study Strategy Research* (pp. 25–42). Mahwah, NJ: Lawrence Erlbaum Associates. [GS Search](#)
- Rosenthal, J. & Ehri, L. C. (2008). The mnemonic value of orthography for vocabulary learning. *Journal of Educational Psychology*, 100(1), 175–191. <https://doi.org/10.1037/0022-0663.100.1.175> [GS Search](#)
- Scarborough, H. S. (2002). Connecting early language and literacy to later reading (dis)abilities: Evidence, theory, and practice. In S. B. Nueman & D. K. Dickenson (Eds.), *Handbook of early literacy research* (pp. 97–110). New York: Guilford Press. [GS Search](#)
- Shanahan, C., Shanahan, T., & Misichia, C. (2011). Analysis of expert readers in three disciplines: History, mathematics, and chemistry. *Journal of Literacy Research*, 43, 393–429. <https://doi.org/10.1177/1086296X11424071> [GS Search](#)
- Simpson, M. L., & Randall, S. L. (2000). Vocabulary development at the college level. In R. F. Flippo & D. C. Caverly (Eds.), *Handbook of College Reading and Study Strategy Research* (pp. 43–61). Mahwah, NJ: Lawrence Erlbaum Associates.
- Stahl, S. A., & Fairbanks, M. M. (1986). The effects of vocabulary instruction: A model-based meta-analysis. *Review of Educational Research*, (56)1, 72–110. <https://doi.org/10.3102/00346543056001072> [GS Search](#)
- Stanovich, K. E., & Cunningham, A. E. (1992). Studying the consequences of literacy within a literate society: The cognitive correlates of print exposure. *Memory & Cognition*, 20(1), 51–68. <https://doi.org/10.3758/BF03208254> [GS Search](#)
- Taraban, R., Ryneanson, K., & Kerr, M. (2000). College Students' academic performance and self-reports of comprehension strategy use. *Reading Psychology*, 21(4), 283–308. <https://doi.org/10.1080/027027100750061930> [GS Search](#)

Whitt, M. (1993). The effect of reading rate on vocabulary. *Journal of Instructional Psychology*, 20(1), 72–78. [GS Search](#)

Wilson-Fowler, E. B.; & Apel, K. (2015). Influence of morphological awareness on college students' literacy skills: A path analytic approach. *Journal of Literacy Research*, 47(3), 405–432. <https://doi.org/10.1177/1086296X15619730> [GS Search](#)

## Appendix A

### Intervention Script to Illustrate Vocabulary Learning Strategy Instruction

A chart displayed a title: “Use These Clues to Figure Out the Meaning of Unknown Words.” Below the title were prompts for the use of context, morphology, and syntax. The prompt for context was “Find other words in the text that help you understand this word.” The prompt for morphology was “How is this word or part of this word similar to other words you know?” The prompt for syntax was “What is the function of this word in the sentence? Does this word name something, is it a noun, describe something, is it an adjective, or is it an action, a verb?” The researcher modeled how to use the chart by thinking aloud, using each of the strategies. The researcher pointed to the first target word and said, “Let’s figure out what this word means.” The following illustrates the modeling of strategy use for the first target word in the first passage. The target word is underlined here: “Some children are slow and cautious in temperament while others tend to be more impulsive.” The researcher stated the following:

The first clue listed here, context clues, says, “Find other words in the text that help you understand this word.” The words that may help are: *Some children are slow ... while others tend to be more impulsive.* The word *temperament* can be seen as labeling the way children may respond or react. Reacting slowly and thoughtfully is one way. Reacting quickly and impulsively without thinking it through is another way.

The second clue, similar words, asks, “How is this word or part of this word similar to other words you know?” The word *temperament* has two parts, *temper* and *ment*. *Temper* is similar to *temper*, as in what kind of temper does the child have? *Tempera* is also similar to *temperature* as in a measurement of heat. I know other words that end with *ment*. Let’s see how they work. For example, take the word *enjoyment*. *Enjoy* is an action. When you add *ment*, the word becomes a label that names the state (*enjoy* - happy) that results from the action. *Ment* gives a name to an action. For *temperament*, *temper* refers to the action, and *ment* refers to the state in a person that results from the action.

The third clue, function clues, asks, “What is the function of this word in the sentence? Does this word name something—is it a noun, describe something—is it an adjective, or is it an action—verb?” As we figured out in the similar-words clue, words that end in *ment* are words that give a name to the action, they are nouns.

So using these cues, we can figure out that *temperament* describes the way that children respond to events; they may respond slowly or impulsively.

We came to an understanding of the word *temperament* from the context clues. Using the other clues helped confirm our understanding. When we use the clues, remember that they can be used separately or together. Sometimes some clues will be more helpful than other clues.

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## Appendix B

### Vocabulary Words Targeted as Unfamiliar in the Passages

#### **Passage 1**

Temperament  
Component  
Empowered  
Logistical  
Sociodramatic

#### **Passage 2**

Shun  
Impediments  
Urgency  
Barrier  
Cast  
Reprimanded  
Locus

#### **Passage 3**

Manuscript  
Cursive  
Advocated  
Exclusive  
Proffer  
Legibly  
Facilitate

#### **Passage 4**

Phenomena  
Nativists  
Preliminary  
Acuity  
Entities  
Inanimate  
Heritage

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