AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF AN IMAGERY STRATEGY ON VOCABULARY LEARNING AND RETENTION

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ABSTRACT

Policy mandates to increase the time dedicated to the teaching of reading and mathematics has left little time for arts instruction. Recent research has indicated a positive relationship between improvement in reading comprehension and the integration of arts into instruction. Teaching students to use mental imagery as a reading strategy is one approach that capitalizes on a dual coding view of learning while incorporating arts into content classes. The goal of this experimental study was to add empirical support to the growing body of literature establishing the use of mental imagery as a reading strategy. General linear modeling was used to investigate the effect of an imagery strategy on vocabulary learning while controlling for prior vocabulary knowledge. The results reveal that students who learned vocabulary using an imagery strategy had better retention of those words than students who used a typical approach to learn vocabulary. The findings suggest that including imagery in vocabulary instruction will help with deeper processing of the vocabulary words. Imagery instruction serves a dual purpose of improving reading and including arts in classes where arts instruction has been neglected. The findings from this study have implications for teachers, school administrators and planners, and policy makers, as they provide support for integrating arts into content areas.

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CHAPTER 1

INTRODUCTION

Background of the Problem

According the National Assessment of Educational Progress (NAEP) report card (2011), only a third of our nation's fourth graders are proficient readers. The 2011 NAEP results showed no improvement made in fourth-graders' reading comprehension scores between 2009 and 2011. The 2011 NAEP results demonstrated improvement in both reading and math at both fourth and eighth grades in Hawai‘i, the only state in the nation to boast that particular improvement. However, although Hawai‘i's fourth graders had a score increase over the 2009 results, they still scored six points lower than the national average, placing below 37 states and about the same as ten states (NAEP, 2011). These low reading scores demonstrate a great need for effective, research-based reading instruction that works not only with Hawai‘i's public school students, but also students across the nation who struggle with reading.

While there are debates about how to best teach reading, there are a few agreed upon basic components for learning to read. The report of the National Reading Panel (National Institute of Child Health and Human Development, 2000) identified alphabetics (phonemic awareness and phonics instruction), fluency, and comprehension (vocabulary and comprehension strategies instruction) as the factors involved in reading. Initially, learning to read focuses on decoding skills although comprehension is still a goal (Paratore, Cassano, & Schickedanz, 2011). Once students are in third or fourth grade, reading for meaning becomes the focus as texts become more complex (Paratore et al., 2011). This progression assumes that students are proficient and automatic decoders, and

for teachers, means a move away from the teaching of phonics and word attack skills and a move toward the teaching of comprehension skills.

Research shows that students who have trouble with the initial stages of learning to read are typically exposed to less print than those who can decode (Allington, 1984; Biemiller, 1977–1978) and are often provided with reading materials that are too difficult (Allington, 1977, 1983, 1984; Gambrell, Wilson, & Gantt, 1981). The blend of difficulty with decoding, less exposure to and practice with print, and inappropriate materials causes many students to have less-than-rewarding early reading experiences, and as a result, to spend less time in reading activities (Cunningham & Stanovich, 1997). Because these readers have limited practice, their decoding of the text involves cognitive resources that should be used for comprehension and other higher level reading activities. As a result, "reading for meaning is hindered, unrewarding reading experiences multiply, and practice is avoided or merely tolerated without real cognitive involvement" (Cunningham & Stanovich, 1997, p. 934). A possible explanation for a non-proficient reader's difficulty with comprehension while focused on decoding comes from cognitive load theory which states that learners can be overcome by the number of components that need to be processed concurrently before comprehension begins (Paas, van Gog, & Sweller, 2010).

Considerable research has been undertaken to explore what non-proficient readers are missing within the reading process. Non-proficient readers engage in few study behaviors like asking questions and taking notes (Pearson, Roehler, Dole, & Duffy, 1991), do not monitor the information essential to comprehending text, and are unaware of the effect negative monitoring strategies have on comprehension (Paris & Myers,

1981). The crucial difference between proficient and non-proficient readers is in their capacity to provide and use strategies to monitor comprehension (Golinkoff & Rosinski, 1976; Paris & Myers, 1981). Strategy instruction is a highly researched area that offers ways for teachers to systematically help students become better readers (e.g., Palincsar & Brown, 1984; Pressley & Afflerbach, 1995; Pressley, El-Dinary, Gaskins, Schuder, Bergman, Almasi, & Brown, 1992;). Some of the more widely researched and recommended strategies include summarizing, self-questioning, and metacognitive awareness training (Sung, Kuo-En, & Jung-Sheng, 2007). Instructing students in the use of imagery is one strategy that has been shown to improve reading comprehension (Bell, 1991; Bourdin, Bourdin, & Manley, 1993; Cohen & Johnson, 2010; Finch, 1982; Gambrell & Jawitz, 1993; Oliver, 1982; Pressley, 1976). Instructing students to use imagery for improving reading comprehension serves a dual purpose as it allows for the inclusion of more arts in school, which is a portion of education that has been severely cut in recent years. However, studies have shown that arts education has a positive effect on students both socially and cognitively (Deasy, 2002; Hetland & Winner, 2001), and integrating the arts into instruction is linked to academic gains in all subjects (Gullatt, 2008).

Statement of the Problem

Nationally, pressure from the No Child Left Behind Act (NCLB) has resulted in increased time spent on reading and mathematics instruction while arts instruction time has suffered (Beveridge, 2010; Center on Education Policy, 2008). While the arts are included in NCLB as a core subject, testing is only mandated for mathematics and reading. Even though Hawai‘i has fine arts content standards, the results of a 1998 survey

of Hawai‘i elementary schools showed that none were offering a standards-based arts curriculum and that only 31 of 304 full-time elementary school teachers are arts specialists (Hawai‘i Alliance for Arts Education, 2008).

In 1999, a partnership called ARTS FIRST Partners, which involves Hawai‘i Arts Alliance, Hawai‘i Department of Education, University of Hawai‘i College of Education, University of Hawai‘i College of Arts and Humanities, Hawai‘i State Foundation on Culture and Arts, and Hawai‘i Association of Independent Schools, was created to tackle the problem of arts education in the schools (Hawai‘i Alliance for Arts Education, 2008). Work from this coalition led to the Hawai‘i State Legislature signing Act 80 which required a strategic plan be created to help schools meet the Hawai‘i fine arts standards (Hawai‘i Alliance for Arts Education, 2008). One initiative that followed this legislative act was the development of the *ARTS FIRST Essential Arts Toolkit: Hawai‘i Fine Arts Grade Level Guide for the K-5 Classroom Teacher* as a way to help teachers integrate arts into elementary school classrooms (Hawai‘i Alliance for Arts Education, 2008). The professional development associated with learning how to use the *Essential Arts Toolkit* helps teachers learn to connect performance and visual arts strategies with the Hawai‘i Content and Performance reading standards. For example, teachers are trained to guide students to use drama techniques to demonstrate their understanding of a reading passage.

The evaluators of two Hawai‘i Arts Alliance research projects that implemented the strategies from the *Essential Arts Toolkit* in schools tentatively concluded that the arts techniques positively affected student reading achievement in one evaluation (Brandon, Lawton, & Krohn-Ching, 2007) but not in another (Brandon, Harrison, & Vallin, 2011). I will describe the evaluations in detail in Chapter 2, but based on the results and a

thorough review of the relevant literature, I narrowed the focus of my study to vocabulary's impact on reading comprehension and the theoretical alignment of one particular strategy of teaching vocabulary through the dramatic arts by using imagery. Although the literature demonstrates that vocabulary is only one component of improving overall reading comprehension, it is a major factor in reading development (National Institute of Child Health and Human Development, 2000), and the field still grows with research focused on one component of reading.

Purpose of the Study

Through this study, I aimed to add to the literature supporting the integration of arts into instruction and the mental imagery literature as it relates to reading strategy instruction. My experimental study examined student vocabulary learning after instruction in using an imagery strategy.

Arts. A number of recent correlational studies using brain-imaging techniques indicated a relationship between arts training and language development. Petitto (2008) found that extensive childhood music education significantly affected second language learning in adulthood. Wandell, Dougherty, Ben-Shachar, Deutsch, and Tsang (2008) found a positive relationship between the amount of a student's musical training and their reading fluency improvement. Dunbar (2008) investigated cognitive and brain-based differences between performing arts (theater and music) and non-performing arts students on tasks that utilized reasoning and transfer. While there were no significant differences in the functional magnetic resonance imaging (fMRI) results, Dunbar did find differences between the groups in the left frontal lobe, indicating that performing arts students "are more likely to be engaged in symbolic retrieval than non-performing arts students" (p.

90) and that the difference between the two groups is the creation of new ideas. These correlational studies demonstrate a biological relationship between the arts and language, but still leaves questions about the effect of arts in a classroom setting.

Deasy (2002) presented a compilation of 62 studies, both causal and correlational in design, that showed the social and academic effects of the inclusion of arts in the classroom. Nineteen of these studies focused on drama; of these, only three studied middle school students (grades 5-8) and only three studied high school students. The majority of the studies involved students in preschool through fourth grade. Of the three middle school studies, only one measured reading comprehension as an outcome. DuPont's (1992) study of the impact of drama on fifth-grade remedial readers' comprehension showed that the students who used creative drama to enhance text comprehension not only outscored students in the non-drama groups, but they also were the only group to show a significant difference between pre- and posttest scores. There was also transfer of the skills learned by students in the drama group to texts not read with the drama enhancement, which suggests something in the student's approach to reading was changed by the connection between the drama and reading (Deasy, 2002). There are a few important limitations to this correlational study, which DuPont acknowledged, including the use of the researcher as the teacher in the drama group and the use of intact, 17-student classes; however, DuPont stated that the pretesting and coordination between teachers helped to reduce any effects.

Hetland and Winner (2001) described 10 meta-analyses of the research on arts education. The authors reported three areas showing causal relationships between arts and achievement in an academic subject area. One area was "classroom drama and verbal

skills" (p. 4); it was based on results from 80 reports. Specifically, Hetland and Winner found a causal relationship with a medium effect size between acting out texts and story recall, "reading readiness, reading achievement, oral language, and writing" (p. 4); they found a causal relationship with large effect size in the areas of story recall through writing. There was a small effect size for vocabulary, but Hetland and Winner reported that because of the small effect size, it cannot be generalized and is likely not reliable. Like DuPont (1992), Hetland and Winner found the drama not only helped verbal skills for the particular texts students read and acted out, but the verbal skills also transferred to new texts that the students had not acted out. Hetland and Winner reported that this finding is very important for education because verbal skills are critical, and it is not difficult for teachers or schools to add something as simple as drama when so many students will be influenced by it.

Around the same time Hetland and Winner (2001) and Deasy (2002) published their findings, Rose, Androes, Parks, and McMahon (2000) cited an increasing body of literature that indicated arts-based education is linked to improved reading comprehension. Rose et al. stated that there is an overall lack of rigor in the drama-language arts research; while there has been research on drama and language arts, very few of these studies reported valid measures or offered a strong theoretical reasoning for their results. Therefore, the purpose of my study was to use an experimental design to demonstrate that learning vocabulary through a simple-to-implement arts-based (imagery) strategy is more effective in the short- and long-term than a traditional approach to learning vocabulary for sixth-grade students.

Mental imagery. Much of the reading-comprehension research focuses on strategy instruction. Pressley and Afflerbach (1995) reviewed 38 studies that used verbal protocols, where students reported what they were doing as they were reading, and summarized the self-reported reading activities into three categories: processes that occur before reading, during reading, and after reading. Strategies can target these processes to help improve reading comprehension. One reading comprehension strategy, imagery, is called "representing" in the *Essential Arts Toolkit* and is defined as "the imaginative ability to take a thing mentally from a flat plane into three dimensions" (Hawai'i Alliance for Arts Education, 2008, p. 11). Research has shown that teaching students to create mental images of the points communicated by a text improves their recall and comprehension (Gambrell & Bales, 1986; Gambrell & Jawitz, 1993; Pressley, 1977; Sadoski, 1983, 1985). This study aims to build on the mental imagery research by teaching students to use an imagery strategy while learning vocabulary.

Theoretical Framework

The current study's theoretical framework is based on a cognitive theory of dual coding, an application of levels of processing theory to vocabulary learning, and sociocultural theory as it relates to the teaching method used in this study. My perspective is that humans learn through both verbal and non-verbal means, and that the most meaningful and permanent learning is best experienced through activities that encourage deep processing in a classroom that incorporates social learning. My cognitive perspective is explained by Paivio's (1971) dual coding theory. Although I will explain how dual coding theory applies to reading in Chapter 2, an explanation of the original cognitive theory is necessary to understand its application to reading. First, however, it is

necessary to provide a short description of learning and how information is stored in memory.

Memory. In some cognitive theories of learning, external information is detected and briefly held in sensory memory; this information may then move into working memory where it can be used in combination with knowledge in long-term memory and remembered for a short period of time (Woolfolk, 2013). If the information in working memory is necessary to remember for a longer period, it is then processed in a way that will allow it to be stored in, and recalled from, long-term memory (Woolfolk, 2013). According to Anderson (2005), the representations stored in long-term memory, called "propositional representations," are a well-known method for evaluating information in cognitive psychology. A proposition can be described as "the smallest unit of knowledge that can stand as a separate assertion" (Anderson, 2005, p. 147). Research shows that humans don't always recall the exact wording of information, but rather the meaning of the proposition (Anderson, 2005). Related propositions form "propositional networks," and the network organization can often aid in recall if one piece of associated information is remembered (Anderson, 2005). However, because some psychologists argue that pictures are not stored as propositions, not all psychologists believe that propositions are the only kinds of representations being stored in long-term memory. (This is a debate I will briefly describe in Chapter 2.) Specifically, Sadoski and Paivio (2001) argue that in dual coding theory, mental representations preserve some of their primary qualities, and as I explain further in Chapter 2, "are modality-specific rather than amodal" (p. 44). This is in direct contrast with other theories of cognition that, according to Sadoski and Paivio, "assume mental representations are abstract and amodal structures, usually called

propositions or schemata, which are governed and coordinated by equally abstract monitoring mechanisms and executive processes" (p. 43).

Images in memory. While there are numerous ideas about working memory (Cowan, 1995; Ericsson & Kintsch, 1995; Oberauer, 2002), for this particular study, it is helpful to expand on the components of the working memory as it relates to images. Baddeley and Hitch (1974) described a three-part model of working memory that includes two areas for short-term storage—the phonological loop and the visuo-spatial sketchpad. The phonological loop handles auditory information (also the written word as it is transformed silently into speech), and the visuo-spatial sketchpad stores visual information such as aspects of an image or spatial movements. It is in this theoretical visuo-spatial sketchpad where the creation of images while reading or learning vocabulary is held before the image moves into long-term memory.

Mayer (2008b) also provides a theory of learning that includes images called multimedia learning. The three assumptions of this theory, "dual channels, limited capacity, and active processing" (p. 763) are concerned with the kinds of information presented, the amount a learner can process at one time, and the attention that is necessary for processing (Mayer, 2008b). For this study, it is helpful to discuss Mayer's (2001) "dual channels principle" (p. 16). Depending on the presentation of information (verbal or visual), information will work its way from the initial detection in sensory memory into the working memory where it is manipulated and organized (Mayer, 2001). For example, if the information presented is a picture of a dog, the eyes will detect the image and hold it in the working memory; it is then organized into a model where it can be integrated with prior knowledge and stored in long-term memory (Mayer, 2001). What

is interesting about Mayer's (2001) dual channels view is that throughout processing, the verbal channel and image channel talk to each other, creating an integrated representation, so that, for example, the image of a dog the learner detected can elicit the word dog, either the sound of the word or even the spelling of the word.

Mayer (2001) provides a good rationale for the two systems. First, if information is presented through both verbal and imagery modes, more information can be presented, "just like more traffic can travel over two lanes than one lane" (p. 4). For example, in technical manuals and science textbooks, it is common to find information presented both in text and in diagrams or pictures. Although Mayer finds this first explanation incomplete because it assumes the two modes of presentation are equal, it helps explain the second rationale. Mayer suggests that depending on the information to be presented, a verbal or pictorial representation may be better, and that understanding happens when the dual codes are integrated. Mayer's dual channels are based in part on Paivio's (1969, 1971) dual coding theory, which for the purposes of this study, serves as a guiding theoretical framework because of its application to reading.

Dual coding theory. According to Paivio's (1969, 1971) dual coding theory, humans use both mental images and verbal codes to represent information in their memories for storage, use, and retrieval. The basic theory, as described by Sadoski and Paivio (2001), includes stimuli perceived by the sensory system, coded either non-verbally or verbally into a "mental representation" (p. 43) and "processed" (p. 43) within or between the two coding systems. The basic units are called imagens in the non-verbal code and logogens in the verbal code (Sadoski & Paivio, 2001). However, the common terms of verbal and non-verbal or imagery will be used throughout this paper.

The first coding system, imagery, is non-verbal and includes, for example, objects and scenes we have seen; the image may be a whole object or just parts of a scene (Sadoski & Paivio, 2001). While some images are grounded in a physical reality that can be seen, Paivio (as cited in Bell, 1991) and Aylwin (1985) wrote that imagery also includes emotion. Therefore, according to the dual coding theory of cognition, the mental images generated, stored, and retrieved, can be a combination of any available information that is non-verbal. The second coding system, verbal, uses symbols to represent knowledge (Paivio, 1969, 1971). Words and numbers are examples of symbols chosen to represent something. Unlike the codes used in imagery, verbal codes do not physically resemble or represent an object.

As I will explain in more depth in Chapter 2, the two systems are both organized hierarchically, but the verbal system is sequential and the non-verbal system is not (Sadoski & Paivio, 2001). However, connections can develop between, and within, both systems. This means that it is possible to shift between systems so that a verbal code becomes a non-verbal code (e.g., reading the word "pen" elicits an image of a pen), and within in a system (e.g., writing something you just spoke). The inter- and intra-system organizations, as well as the modes of perception, are better explained in terms of reading. While dual coding theory originated as a theory of general cognition, from this short explanation of the theory, it is clearly closely tied to reading.

Sadoski and Paivio (2001) argued for a theory of literacy that is based on a theory of general cognition. As I will explain in Chapter 2, dual coding theory is their literacy framework because it includes both verbal and non-verbal cognition and "provides an explicit psychological account of literacy's most central but elusive ingredient: meaning"

(p. 2). Sadoski and Paivio argue against theories of literacy that don't include non-verbal processes. They also argue against theories that do include non-verbal processes on a surface level where only the input and output are non-verbal, not the deeper levels of cognition which, in these theories, are completely verbal coding through the use of propositions. Thus, Sadoski and Paivio (1994) introduced dual coding theory as a view of reading that also included "comprehension, learning, appreciation, and reader response" (p. 6). Although dual coding theory serves as the main theoretical basis for this study, because this study focuses on vocabulary learning, it is helpful to include perspectives on vocabulary acquisition in my framework.

Levels of processing. There are different interpretations for what it means to know a word. These descriptions have changed over time, but share similar qualities. Many explanations of word knowledge can be explained by Craik and Lockhart's (1972) "levels of processing framework" that suggests that information is more likely to remain in long term memory if it is processed deeply. The term "depth of processing" refers to the extent to which a person considers an idea and how that person connects the idea to prior knowledge; little time and effort spent on understanding will lead to a shallow processing, whereas putting in effort and elaborating, or making the idea more complex, will lead to deep processing (Craik & Lockhart, 1972). Although the following three explanations of word knowledge do not specifically mention Craik and Lockhart's framework, the framework can be applied to each explanation.

As early as 1942, in an article describing the current state of diagnostic vocabulary testing, Cronbach described knowledge of a word and how the knowledge is used as different dimensions: (a) generalization—being able to define a word; (b)

application—being able to use the word in suitable situations; (c) breadth—having knowledge of a word's multiple meanings; (d) precision—being able to use the word appropriately in all situations and recognizing when a word is not used appropriately; (e) availability—applying a word with ease in thought, conversation, and writing.

Beck, McKeown, and Omanson (1987) suggested a continuum for knowledge of individual words. At one end of the continuum is lack of knowledge of the word; at the other end of the continuum is knowledge of a word outside of context, how it relates to other words, i.e., synonyms and antonyms, and how it could be used metaphorically (Beck et al., 1987). In between is having a broad sense of the word, e.g., it has a positive connotation; possessing a context specific understanding of the word, e.g., knowing a sharp knife could cut you, but not knowing what a sharp person is like; and understanding a word but not having the ability to quickly use it in the proper situation (Beck et al., 1987).

Perfetti (2007) developed the Lexical Quality Hypothesis (LQH) based on his belief that while it is true that proficient readers identify words quickly and comprehend what they are reading, the focus on efficiency training leaves out knowledge of words. According to Perfetti, knowledge of words includes "knowledge about word forms (grammatical class, spellings, and pronunciations) and meanings" (p. 359). The LQH posits that word knowledge is the meeting point between identifying a word and comprehending a text; reading occurs word by word as each word is identified, understood, and integrated into a mental model of what is being read (Perfetti, 2007). Therefore, for any reader, knowledge of lexical quality (LQ) can vary based on school experiences, and, according to Perfetti, biology, and culture.

These three explanations of word knowledge by no means cover the many descriptions of word knowledge, and current understandings will likely be built upon as more research is added to the field. As Beck, McKeown, and Kucan (2002) stated, knowing a word is "clearly a complicated, multifaceted matter, and one that has serious implications for how words are taught and how word knowledge is measured" (p. 11). Beck et al. believed that most teachers want their students to be able to understand the taught vocabulary in reading and use it correctly in communicating. What is clear from this discussion is that there is a difference between simply knowing a word and its pronunciation and meaning, and knowing how the word relates to other words and larger concepts. When Craik and Lockhart's (1972) "levels of processing framework" is applied to these explanations of word knowledge, the surface level understanding of words, i.e. knowing a definition or part of speech, is shallow processing; applying words in different contexts, integrating words into prior knowledge, and understanding words as metaphors are all examples of deep processing. Deep processing can be aided by particular instructional approaches, including the vocabulary learning approach presented in this study, which also incorporates aspects of a sociocultural approach to teaching and learning.

Sociocultural theory. While dual coding theory offers a cognitive base for my study, the social-learning aspect of my study requires a different lens. My perspective is that particular reading comprehension strategies are appropriate for group situations, and successful vocabulary learning can occur in a classroom reflective of a sociocultural approach to teaching and learning. This sociocultural approach is reflective of the Vygotskian approach to learning. Vygotsky's view of learning is socially and culturally

based, rather than something that takes place solely within an individual (Kozulin, Gindis, Ageyev, & Miller, 2003). This is based on Vygotsky's (1978) premise that social learning and interaction must take place before learning moves to the psychological plane within an individual. Moving this into a classroom, in a sociocultural view of learning the teacher and learner are both active participants in the learning (Rogoff, 1995). In this classroom, "activities that require cognitive and communicative functions" (Tharp & Gallimore, 1988, p. 7) are used to develop those functions in students.

A classroom that incorporates arts strategies with reading instruction addresses Vygotsky's key concepts of learning: semiotic mediation, the zone of proximal development, and internalization. Semiotic mediation is the use of symbols, or language, to help learning happen by mediation through another person or a learning activity (Kozulin et al., 2003). The zone of proximal development falls between what learners can do independently and what they can do with the assistance of an adult or more capable classmate (Vygotsky, 1978). Teachers assist learners within their zone of proximal development by structuring activities that are social (Smith, Teemant, & Pinnegar, 2004). For example, as students orally read a book as a class and then stop to represent and discuss a vocabulary word using an arts strategy, they are being supported within their zone of proximal development and using semiotic mediation to further their understanding of the reading. Internalization is a process that happens through social activities when changes are made within a learner's mind (Smith et al., 2004). It is best seen in the transformation of language from verbal speech to inner speech (Vygotsky, 1986). For example, students learn new words by hearing them spoken and physically

representing them in social situations. Students internalize the meanings of a new word when they learn to use the word correctly in a spoken or written context.

Research Question

This study aims to answer the research question and sub-question: Do students trained in using an imagery strategy to learn vocabulary have higher vocabulary scores on a norm-referenced reading test than students who learned vocabulary in a traditional way? Do the students trained in using an imagery strategy to learn vocabulary retain words longer than students trained in a traditional strategy?

Scope of the Study

This study is about the effects of an arts-based drama strategy that utilizes imagery on vocabulary learning. Findings from this study will contribute to the literature on the integration of arts instruction into the reading classroom. Findings will also contribute to the literature on vocabulary learning as part of reading comprehension.

Definition of Terms

Imagery: The literature on imagery is reviewed in Chapter 2. This paper will focus on mental imagery as it is central to the strategy students will be instructed to use to learn vocabulary. Mental imagery is far more than just a static image a student might recall from memory as it can also include sights, sounds, feelings, and motivation.

Imagery strategy: The imagery strategy students will be trained to use in the experimental condition is called Snapshot. It is described in detail in Chapter 3. However, as it will be referred to throughout Chapter 2, it is important to know that this technique is one that asks students to consider a vocabulary word or reading passage, physically

represent it with their body, sometimes adding movement or dialogue, and discuss both their own representation and that of other students as a class.

CHAPTER 2

REVIEW OF LITERATURE

The teaching approach used in this study was developed by artists and educators in the ARTS FIRST Partners as a way to incorporate arts into schools. While very little research has been done on teaching approaches in the Hawai‘i Arts Alliance programs, and no research has been published on Snapshot, the particular imagery strategy used in this study, there has been some research on the use of imagery to teach reading. My study builds on those findings and contributes new support for teaching reading through the arts. The literature review begins with a summary of the prior studies done on the Hawai‘i’s Arts Alliance programs, demonstrating the need for my study. I then review the literature supporting my approach. I begin by describing vocabulary’s importance in reading. I present an explanation of imagery, followed by the cognitive theory that applies to my study, and conclude with prior studies that show a connection between imagery and reading.

Previous Arts Alliance Studies

There have been two previous studies of the strategies taught in the *ARTS FIRST Essential Arts Toolkit: Hawai‘i Fine Arts Grade Level Guide for the K-5 Classroom Teacher*. The first study, titled Arts First Windward Research Project (AFWRP), was a group-randomized design with three matched schools (Brandon, Lawton, & Krohn-Ching, 2007). Teachers in the project schools received professional development for using the strategies in the *Toolkit*. Teachers attended six full-day professional development institutes where they learned the strategies for incorporating arts into

classroom instruction, and artists served as mentors for teachers, observing the teachers while they utilized arts strategies in their classes (Brandon et al.). Over the course of the study, teachers implemented strategies in the categories of drama, dance/music, and visual arts; each category had 15-20 strategies that fell under the three underlying strategies of observing, patterning, and representing (Brandon et al.). Snapshot was not one of the strategies included in this evaluation.

Because this three-year study was evaluating a project, a number of indicators were measured, including student achievement, student attitude towards school, and student interest in the arts; the frequency and quality of classroom implementation; and teacher attitude and opinions about teaching with the arts. Because my study focuses on measuring students, I limit my report to student outcomes.

Student achievement in reading and mathematics was measured using the results of the annual Hawai‘i State Assessment (Brandon et al., 2007). Attitude towards school was measured using the School Attitude Survey developed by McCoach and Siegle (2003). Interest in the arts was measured using the Student Interest-in-the-Arts Questionnaire which was developed by Brandon and Lawton (in press). An ANCOVA analysis was run on each instrument. Results were statistically significant for the project group on mean scores for student reading achievement. However, most of the difference was due to just one of the project schools as one of the control schools outperformed the other two project schools. There were statistically significant results for all three project schools on student mathematics achievement mean scores.

Two longitudinal analyses were run on the student achievement data (Brandon et al., 2007). The first analysis looked at fifth-grade cohorts over the entire project period.

Students in the project group had lower reading scores than the control group at the end of year one; however, at the end of the three year project, students in the project group had higher reading scores than the control group. The math scores were also higher for the project group at the end of the project. The second analysis looked at a group of students tested in Grade 3 at the beginning of the project and again in Grade 5 at the end of the project. The project group performed better than the control group; however, this was not due to an increase in project group scores but rather to a decrease in control group scores.

The evaluators tentatively suggested that the project did positively affect reading achievement because the project schools did perform better than the control schools; however, the project school with the highest scores also implemented a well-known reading program during the project period, which could have influenced the results (Brandon et al., 2007). In mathematics achievement, all three project schools did outperform the control schools; this finding reflects teacher feedback that the arts strategies were effective in mathematics instruction.

The analysis of school attitude also showed a significant difference between groups (Brandon et al., 2007). There was also a difference between groups on the Student Interest-in-the-Arts Questionnaire for dance and music, but not for drama and visual arts. However, like the reading outcome, one project school accounted for much of the difference as one control school outscored two project schools.

While the overall findings seem somewhat positive for the use of the numerous arts strategies included in this evaluation, there are a few things to consider. The number of schools in the study, as well as the lack of control over the groups involved, made it

necessary for the evaluators to make some adjustment for differences (Brandon et al., 2007). The evaluators chose ANCOVA as a way to adjust for effects in the student population; however, they acknowledged that the use of ANCOVA did not totally remove the differences due to non-comparable groups. In addition, the validity of the study was threatened by low statistical power, although the evaluators suggest that, given the significant differences in achievement, this may not be as big of an issue.

The evaluators made some recommendations for the next project. I will report the recommendations pertinent to my study. First, the Hawai‘i Arts Alliance project personnel should determine which arts strategies are most effective and focus professional development on those strategies (Brandon et al., 2007). For this project, over forty activities had been taught in the professional development. As mentioned earlier, Snapshot, the imagery strategy utilized in the present study, was not included among the activities in this evaluation. However, for the next project, Snapshot was one of the six strategies included. Second, the Hawai‘i Arts Alliance project personnel should explain to teachers that the frequency with which the strategies are used in the classroom might affect student achievement.

The second study evaluated the Arts and Literacy for All Project (ALA). This project took place in all grade levels in four elementary schools over three years; however, the evaluation focused on Grades 3-5 in the final year of the project (Brandon, Harrison, & Vallin, 2011). This project implemented the recommendations from the former AFWRP evaluation. In contrast to the over 40 activities utilized in the first project, this time only six strategies were taught, including Snapshot, Tableau, and Expressive Dance; these three strategies build on Snapshot as Tableau applies the same

activities as Snapshot in a group setting, and Expressive Dance has students add movement to the Snapshot (Brandon et al., 2011). Teachers again took part in six full-day professional development institutes to learn the strategies, as well as received mentoring in their classrooms as they implemented strategies with their own students.

The initial study design was quasi-experimental with pre-post matched groups. In this design, the project training was withheld from two of the schools for the first year and implemented in the second year. Prior to conducting the evaluation of the final year, the evaluators looked at data collected in the first two years of the project. What they found resulted in a change of evaluation design. Unlike the AFWRP findings, the students in the ALA project schools had lower reading achievement scores than the students in the control schools. The first two years of the ALA project also resulted in a lot of information about teacher use of the strategies as it related to attending professional development, mentoring, and the length of time in the project. It was determined, however, that the length of time in the project did not positively affect student achievement. Thus, to help the project staff learn more about the characteristics of teachers in the project and how those characteristics might be related to strategy use, the evaluation design was changed to a focus on teachers only, looking at their experiences in the project using a questionnaire and a mixed method case study.

Of interest to my project is the student achievement test scores for the case-study teachers. For the case study, the project director selected seven teachers from across three of the four project schools who she felt implemented the arts strategies well. Since the project staff was interested in determining if the current measure of student achievement was too insensitive, they wondered if positive results would emerge from a test given

immediately after teaching a reading passage with the arts strategies taught in the professional development (Brandon et al., 2011). The case study teachers taught the reading passage with the arts strategies; another group of teachers did not. Using a significance criterion of .10, two of the seven case study teachers did have statistically significant higher achievement test results than their comparison groups; the remaining five teachers' students performed very little or no different than comparison groups (Brandon et al., 2011). Overall, the evaluators suggested that there were no effects of the project on the reading achievement of students of the case study teachers (Brandon et al., 2011).

Based on the ALA evaluation, there were suggestions for further study related to my project. The evaluators recommended teaching the strategies with a focus on vocabulary or characters in a text and that research on the strategies should be conducted with teachers who are comfortable using the arts to teach language arts (Brandon et al., 2011).

Combining the recommendations for further study from both evaluations helped me to design my study, in which I was also the teacher. In the AFWRP evaluation report, it was suggested that professional development should focus on the most effective strategies (Brandon et al., 2007). In my study, I focused my teaching on only drama strategies, specifically the Snapshot strategy which I describe in detail in Chapter 3. It was also recommended that teachers be informed that the frequency with which they use the strategies impacts the effect on student achievement. In my study, I taught with the strategy every single day of each vocabulary unit, giving students many days to practice the strategy.

The ALA evaluation contributed a number of issues for consideration in my research as well. The evaluators recommended that research should be done with teachers comfortable using the strategies. Having taught drama to upper elementary students for many summers, I am quite comfortable teaching with drama. In addition, as is the case with many educational studies, it is often necessary to statistically adjust for group differences because of the lack of control over the group make up. I was fortunate to conduct my study in a school where I could randomly assign students to classes before the school year started, which is helpful in distributing differences among group members. Finally, an important recommendation was to focus on teaching vocabulary with the strategy, rather than teach an entire reading passage, because it would be easier to measure the effect of the strategy. Thus, rather than trying to see the impact of an arts strategy on overall reading comprehension, my study measures student achievement on a vocabulary test after having taught the vocabulary words with the strategy. As I will explain in this next section, vocabulary plays an essential role in developing reading comprehension.

Vocabulary and Reading Comprehension

Vocabulary is a very important aspect of reading and has been researched for over 100 years. Research conducted from the beginning of the 20th century to the early 1980s demonstrated that vocabulary is definitely linked to reading comprehension (Davis, 1944; Anderson & Freebody, 1981) and that larger vocabularies lead to greater reading comprehension (Kame‘enui & Baumann, 2004). Vocabulary instruction has been accepted as one aspect of developing reading skills for years (National Institute of Child

Health and Human Development, 2000). The importance and complexity of vocabulary learning is well documented as seen in the following findings.

Nation (2009) cited several studies that show "vocabulary knowledge predict[s] growth in reading comprehension and reading comprehension…predict[s] growth in vocabulary knowledge" (p. 178). Based on results of longitudinal studies of predictors of successful beginning reading and reading achievement in later grades, Biemiller (2006) observed that the vocabulary gap that arises before children are even readers is seldom closed in later years; smaller vocabularies are also one reason underprivileged students are unsuccessful in school. Several longitudinal studies examined predictors of successful beginning reading and reading achievement in later grades. Senechal, Ouellette, and Rodney (2006) analyzed some of this data that focused on vocabulary's influence on reading and found that a student's vocabulary in kindergarten accounted for 4% of the unique variance in reading comprehension in third grade and 15% in fourth grade. Others agreed that vocabulary knowledge in the early grades is a significant predictor of later reading comprehension (Cunningham & Stanovich, 1997). These are just some of the many findings from over 100 years of research that demonstrated that vocabulary is definitely linked to reading comprehension (Davis, 1944; Anderson & Freebody, 1981), and this universally accepted idea led the way to modern research about why this relationship exists (Baumann, 2009).

Although there has been much research on the connection between vocabulary and reading comprehension, "the evidence of a causal link between vocabulary and comprehension is historically long but empirically soft" (Baumann, Kame'enui, & Ash,

2003, p. 758). A short review of theoretical approaches about this connection is necessary to understand the current research on vocabulary instruction.

Anderson and Freebody (1981) suggested three hypotheses for the strong connection between vocabulary and reading comprehension. The first hypothesis, instrumentalist, posits that already knowing word meanings facilitates reading comprehension. This implies that directly teaching word meanings prior to reading will positively influence reading comprehension. The second hypothesis, aptitude, suggests that knowledge of vocabulary reflects general ability, meaning that people who have sizeable vocabularies and strong reading comprehension will also have verbal aptitude. The third hypothesis, knowledge, proposes that overall schema about a topic supports vocabulary and reading comprehension. This suggests that spending time before reading to help students build prior knowledge will positively affect their vocabulary and reading comprehension. This third hypothesis is similar to the idea of concepts, which is one of several kinds of knowledge (Mayer, 2008a). Langer (1967) stated that vocabulary development has a direct connection to concept development because words are the foundation of concepts, and that improvement in reading comprehension is reliant on having concepts for understanding.

Other researchers added to these original three hypotheses. Mezynski (1983) suggested that access, based on LaBerge and Samuels' (1974) theory of automaticity, is one possible link between vocabulary knowledge and comprehension. According to this theory, when learning to read, attention can only be given to decoding or comprehension individually, so readers learn to switch their attention back and forth; when decoding becomes automatic, all attention can be placed on comprehending (Samuels, 1994). Thus,

according to the access hypothesis, the quicker a reader can access a word's meaning, the better their reading comprehension.

Krashen (1985) proposed the idea of input, which is based on Vygotsky's (1978) Zone of Proximal Development. According to Krashen's idea, while reading a text, if some of the vocabulary is just beyond a reader's current level of independent understanding, the reader will be able to make connections from what he understands in the reading to the vocabulary he doesn't know. While Krashen's work was actually intended to describe the vocabulary development of second language learners, it has now been adopted as an argument for extensive independent reading (Baumann, 2009).

Nagy (2005) added to Anderson and Freebody's (1981) aptitude hypothesis by suggesting a component for metalinguistic awareness. Nagy (2005) suggested that part of aptitude is the ability to understand and control language features, like syntax and morphology. This means that a reader who can understand and manipulate parts of words will be able to utilize that knowledge to understand more words. This suggests that teaching language features will improve both vocabulary and reading comprehension.

While it would be neat and easy to say that all six hypotheses always hold true, the reality is that the relationship between vocabulary and reading comprehension is complex. There are times when some of the hypotheses provide an explanation, and times when one or more of the hypotheses do not. This can be attributed to many factors, including variations in implementation and testing. However, the hypotheses do help clarify where particular pedagogical approaches to teaching vocabulary found in the research fit within the theoretical base. The imagery strategy used in the present study combines two of the six hypotheses about the vocabulary-reading comprehension

connection. The instrumentalist hypothesis posits that knowing a word meaning facilitates reading comprehension; providing the word and definition addresses this hypothesis. The knowledge hypothesis suggests that building schema about a topic or vocabulary word enhances reading comprehension; the procedure of actively representing a word and discussing the word falls under this hypothesis.

Vocabulary instruction. In recent years, researchers have conducted meta-analyses on the different instructional strategies used in classrooms. The National Institute of Child Health and Human Development (2000) released the Report of the National Reading Panel that catalogued major research-based findings in reading. Vocabulary was one of the aspects of reading they reviewed. While the panel identified more than 20,000 citations, after removing studies that weren't reports or experimental in nature, studies that were published in languages other than English, and studies that dealt with special populations, they were left with 50 studies that met their criteria. Therefore, instead of a meta-analysis, the National Reading Panel reported on trends across these 50 studies. They found that vocabulary instruction does impact reading comprehension when techniques are suitable for a learner's age and ability; vocabulary can be learned from context while reading or being read to; learning words prior to reading them in a text is useful; repeated exposure to vocabulary words aids in vocabulary development. Based on these findings, the National Reading Panel described a few suggestions for instruction. "Vocabulary should be taught both directly and indirectly" (National Institute of Child Health and Human Development, 2000, p. 14); vocabulary words should be reiterated multiple times; vocabulary learning should take place in different ways, through rich contexts, independent and facilitated reading, and with computers; "direct instruction

should…actively engage the student" (National Institute of Child Health and Human Development, 2000, p. 14); and multiple methods should be used for teaching vocabulary.

While there are a number of other summaries of the research on vocabulary, the report of the National Reading Panel is among the most recent. According to Graves (2006), the findings of these summaries and meta-analyses were all very consistent. For the remainder of this section, I will discuss some of the particulars about vocabulary instruction and how they relate to my study.

Instructional strategies. Although much has been written on the topic of vocabulary instruction, Michael Graves (2006), a longtime leader in the field, recommends a four-part approach to teaching vocabulary that includes "providing rich and varied language experiences…teaching individual words…teaching word-learning strategies…[and] fostering word consciousness" (p. 5). Graves' approach is based on the three related ideas—the number of words students need to learn in school is massive; even though it is impossible to teach all the words a student needs to learn, it is still worthwhile to teach some of them; and evidence shows that underprivileged children enter school with smaller vocabularies than their privileged classmates (Coyne, Simmons, & Kame'enui, 2004; Hart & Risley, 1995; White, Graves, & Slater, 1990) which is shown to have an effect on reading (Cunningham & Stanovich, 1997; Hirsch, 2003). Kame'enui and Baumann (2004) agreed with three of Graves' components; however, they asserted that "providing rich and varied language experiences" (Graves, 2006, p. 5) is a major part of all vocabulary teaching and learning experiences. Although my research focuses on teaching individual words, I review the research that supports Graves' and

Kame‘enui’s and Baumann’s organization of the approaches to vocabulary instruction because it is important to understand each approach for improving student vocabulary learning.

Rich and varied language experiences. The amount of words students learn during their school years is staggering. While Nation (2006) mentioned methodological problems with many of the studies that have tried to determine how many word families native speakers know, for the purpose of my study, even a general estimate provides adequate understanding of the importance of teaching vocabulary. Nagy and Herman (1984) estimated that each year, students add about 3,000 words to their vocabularies and know 40,000 words by the time they graduate from high school. Research has shown that the students who read the most also have the largest vocabularies (Cunningham & Stanovitch, 2002). In addition, Graves (2006) pointed out that “most words are learned incidentally, as students are reading, listening, talking, and writing” (p. 38) and that of the 40,000 words students learn throughout their schooling, very few of these are taught. This means that it is very important to provide a school environment that supports learning words through context.

What does a school environment that supports informal word learning look like? Graves (2006) stated that more than any other activity, reading has the biggest influence on vocabulary development. To help students expand their vocabularies, they need to be reading more (Anderson, Wilson, & Fielding, 1988) and they need to be reading books with rich contexts (Graves, 2006). In addition to reading, students need to hear new and challenging vocabulary spoken by their teachers; students need to have discussions that encourage them to use high-level vocabulary words; and students need to write about

complex topics in which they can use high-level vocabulary words learned while reading, listening, and discussing (Graves, 2006).

Teaching word-learning strategies. According to Graves' (2006) review of the research, word-learning strategies refer to using context clues, word parts, and reference tools to learn the meaning of words. In the first word-learning strategy, using context clues, readers try to learn the meaning of a word based on the words around it. Graves (2006) considered using context clues as the most important of the word-learning strategies because most words are learned in context, "and if we can increase students' proficiency in learning from context even a small amount, we will greatly increase the number of words students learn" (p. 94). Graves suggests a four-step strategy for teaching students how to use context clues to infer a word's meaning. The first step, "play and question," (p. 99) happens during normal reading. As students read, they constantly ask themselves if they understand what they are reading. The second step, "slow advance," (p. 99) is used when students realizes they don't understand a word, so they slow down to reread the sentence while looking for context clues as to the word's meaning. The third step, "stop and rewind," (p. 99) is used if "slow advance" doesn't help students gather a word meaning. As the name implies, students read a few sentences that come before the unknown word to try to infer meaning. The fourth step, "play and question," (p. 99), essentially a repeat of the first step, is used if the third step worked. In this step, students replace the unknown word with the meaning they inferred. If the sentence doesn't make sense, or if the third step didn't work, at this point students would use another word-learning strategy.

The second strategy, word parts, or morphology, refers to teaching students to identify morphemes so they can figure out how words function; this includes teaching prefixes, suffixes, and Greek and Latin roots (Graves, 2006). Research on the first word part, prefixes, has shown that 20 of the most used prefixes are found in over 3,000 English words (Graves, 2006). There are two types of suffixes. Inflectional suffixes have grammatical meanings (e.g., adding -ed to move makes it the past tense of move). Derivational suffixes have meanings (e.g., adding –ation to a verb such as explore makes it into the noun exploration). Due to their difficulty, derivational suffixes, as well as Greek and Latin roots, are typically taught with older students. Graves mentioned the difficulty in teaching roots because there are so many and the relationship between the root and the English word that uses it is often vague.

The third strategy, reference tools, refers to teaching students how to use the dictionary. Miller and Gildea (1987) found that students have a hard time using the dictionary to understand new words. Graves (2006) suggested that while students are often taught how to use guidewords and pronunciation keys, they are not usually given instruction in learning from the dictionary's definition.

Fostering word consciousness. Anderson and Nagy (1993) stated that word consciousness includes both an intellectual and emotional appreciation for words that involves metacognition, motivation, and interest regarding words. Graves (2006) added that this consciousness includes "an appreciation of the power of words, an understanding of why certain words are used instead of others, and a sense of the words that could be used in place of those selected by a writer or speaker" (p. 119). Graves argued that because students learn so many words incidentally, a positive attitude towards words is

important. Graves pointed to modeling, both with spoken language and written texts, as a way to encourage students to both use interesting words and begin to appreciate words. Blachowicz and Fisher (2004) also suggested engaging students in word play based on research that points to word play requiring students to reflect on words, be active participants in thinking of words, and provides practice with words. Word play would include activities that utilize homophones, idioms, and puns. Graves also mentions that student motivation and understanding increases when including activities for word learning such as drama or utilizing concrete objects or gestures.

Teaching individual words. Graves (2006) provided five reasons for teaching individual words: (a) with each word taught, the child has one less word to learn on their own; (b) each new word adds to the supply of words children can use to investigate their environments; (c) specifically taught words can aid a student in comprehending reading passages that include those words; (d) more words can help a student improve their communication; and (e) showing an interest in words can help students develop their own interest in words.

There are a number of considerations when teaching individual words. The amount of time spent on teaching vocabulary will impact the kind of instruction, and as a result, the depth of understanding students will have of words. Stahl and Fairbanks (1986) suggested that including both a definition and context in the teaching of individual vocabulary words is stronger than teaching just the definition. Beck and McKeown (1991) expanded on Stahl and Fairbanks by proposing that vocabulary instruction that activates prior knowledge and provides comparisons among word meanings is stronger than learning just a definition and context. Beck et al. (2002) showed that vocabulary

instruction that involves active learning, inferences, connections to prior knowledge, and regular exposure to the words is effective in helping students learn words deeply. However, as Graves (2006) pointed out, any vocabulary instruction is going to be better than no vocabulary instruction at all. Because amount of time dedicated to teaching individual words is important, for my research, I set aside an entire week for teaching the words in the intervention.

It is clear that the more time spent on vocabulary instruction, the more students will learn. From a cognitive perspective, Mayer's (2001) conceptualization of multimedia learning helps to explain the considerations to teaching individual words. The interactions that occur between information in the dual channels, which would happen with active learning and making comparisons, is a major part of Mayer's theory. Furthermore, making connections to prior knowledge, another part of Mayer's theory, allows for both elaboration and deeper processing of words (Craik & Lockhart, 1972), which are then stored in long-term memory.

In addition to how much time to spend on teaching vocabulary, what words to teach is also a major consideration. When you think of the number of words in the English language, it can seem like an impossible task to teach all of them one by one. However, McKeown and Beck (2004) described three tiers of words. The first tier has basic words that don't require instruction; "the second tier contains words that are of high frequency for mature language users and are found across a variety of domains" (p. 14); the third is made up of words that aren't regularly used and are domain specific. If we accept this tier idea, the actual number of words to be taught drastically shrinks. Although

my study utilized words in a standardized test, these words are likely in the second tier because they are not domain specific but do require instruction.

Based on his own work and the work of others in the field, Graves (2006) provided six guidelines for vocabulary instruction. Most of these guidelines reflect the report of the National Reading Panel's (2000) suggestions for vocabulary instruction. Graves mentioned that these guidelines are not hard and fast rules that must always be followed, but rather they should be applied when appropriate. Graves suggested that (a) students need both definition and context of words; (b) students should be engaged with active and deep processing of words; (c) students need to encounter the words many times in different contexts; (d) students need to be reminded of the word over time and in multiple contexts; (e) students need to discuss the word; and (f) students need to spend time working with a word. In my research, I addressed at least four of Graves' six guidelines for vocabulary instruction. In Chapter 3 I provide a transcription of some instruction where these guidelines can be seen in action. During instruction using Snapshot, I provided both the definition and context of words. The nature of participating in Snapshot required students to be active, and they were encouraged to process words deeply; they discussed the word and spent time working with the word. Finally, my strategy also incorporated some of the Report of the National Reading Panel's (2000) suggestions for vocabulary instruction; specifically, I directly taught vocabulary in a rich context while actively engaging my students.

There are many strategies for teaching individual words. This is evident by the sheer number of books available on the topic. For this discussion, I will describe a few strategies that appeared relevant to my research on using Snapshot as they also included

either images or teaching a word within a rich context that is familiar to students. Beck et al. (2002) wrote a book describing robust vocabulary instruction. This technique is typically used to teach a set of words instead of an individual word. Robust instruction suggests that you begin with definitions students will understand. The teacher should provide the words in several contexts. Students will need multiple opportunities to work with the words, and they should participate in activities where they need to consider the different ways in which the words can be applied to situations. Students should practice using the words in class, and they should be encouraged to use the words on their own outside of class. In one example provided by Beck et al. (2002), students were first introduced to new vocabulary words when the teacher showed a picture of the word. The class engaged in a discussion about each picture which helped the teacher develop a definition for each word which the students then wrote. Completing sentences using the words, as well as choosing between two words as they related to questions from a reading passage, were done as follow-up whole-class activities. Students also engaged in independent activities, including another sentence-completing activity, a word-to-definition matching activity, and comparison-contrast activity. Aside from the initial picture introduction, all these activities are verbal. However, the connection to reading passages, comparison-contrast, and multiple exposures are similar to Snapshot.

Graves (2006) described the Frayer Method. There are six major steps to this method.

1. Define the word and describe its features, showing a picture if possible.
2. Help students separate the word from other similar words.
3. Provide examples and tell why those are examples.

4. Provide non-examples and tell why they are non-examples.

5. Give students both examples and non-examples and have students determine which it is.

6. Allow students the opportunity to present examples and non-examples and explain why.

Although Snapshot does not follow this method exactly, several features are present in Snapshot, including defining the word and its features, and providing and determining examples and non-examples (this is done through drama and discussion).

Another example of teaching individual words comes from Johnson, Pittelman, and Heimlich (1986). In semantic mapping, the teacher presents the word and asks students to produce related words. The teacher groups these student-generated words and then asks students to provide names for these groups of words. Finally, the class discusses the word and its relationship to the categories and other words. Although this is strictly a verbal activity, it is similar to Snapshot in that students are generating images related to the word. Thus, both semantic mapping and Snapshot allow students to broaden their concepts to which particular vocabulary words are related.

It is apparent that while vocabulary learning is a complicated process with many options and approaches to consider, it is an important component in reading comprehension. While most vocabulary that students will learn will not be through direct instruction, there is still evidence to suggest that teaching individual words and word learning strategies can improve vocabulary knowledge. The imagery strategy I used, Snapshot, is not among the vocabulary strategies mentioned in the research. However,

through a review of the literature, I found that Snapshot incorporated many of the factors determined to help students learn vocabulary.

Imagery

The strategy utilized in this study, Snapshot, as briefly described in Chapter 1, requires students to employ imagery. There are many definitions of imagery. Mayer (2001) distinguished between information presented verbally or visually; verbal information includes words, presented written down or orally, whereas visual information is presented in pictures that can be static (a photograph or a chart) or dynamic (a video). Other researchers proposed that mental imagery includes sights, sounds, feelings, and motivation (Aylwin, 1985; Sadoski, Paivio, & Goetz, 1991). Fleckenstein (2002) stated that "mental imagery consists of that never-ending stream of sights, sounds, and sensations circulating within us. It can manifest itself as a static visual representation or as a series of frames fading into each other like a film where smells, sounds, and feelings interweave" (p. 7).

According to Fleckenstein (2002), images are created as a pattern of relationships that are induced as attention moves from thing to thing. Just as a pronoun is related to its antecedent, so is the bird related to the tree it is sitting on; it is these relationships that create mental images (Fleckenstein, 2002). These relationships fall along three related axes of attention, physiology, and context (Fleckenstein, 2002). In the first axis, attention, images are categorized into relationships, including those of hierarchy, part-whole, cause-effect (Fleckenstein, 2002). For example, a dog is not a mouse, a tail is part of a dog, a dog barks to get attention. The second axis, physiology, provides limits to what we can see and imagine based on brain structure (Fleckenstein, 2002). For example, our brains

cannot conjure an image of a tree growing over years unless it had previously seen a time-lapsed video of this event. The third axis, context, greatly impacts all parts of imagery because imagery is affected by culture in what we see and how we interpret it (Fleckenstein, 2002).

Because image construction is partially based on individual experiences, students raised with different cultural and economic backgrounds, such as the students in my classes, will construct very different images from each other. This is where the whole-class discussion of the imagery strategy becomes important. While it is acceptable for students to have different images, they need to have accurate understandings. For example, the word "mallet" could take on different images for my students. One student who may have more experience with music could think of a mallet used with percussion instruments. This image may include a soft or hard use of the mallet when trying to achieve certain volumes. Another student whose parent does a lot of work around the house may have an image of a mallet as something used in construction, such as pounding a stake into the ground. This would likely include very large movements to get the stake as secure as possible. It is important for the students to understand that neither image is wrong but that there are different contextual uses for a mallet, and based on a purpose the magnitude of the physical movements involved in using the mallet will change. Therefore, a discussion would include different interpretations and may expand or change some students' images.

In addition to mental imagery from senses, many suggest that images and emotion are also connected (Fleckenstein, 2002). Sadoski et al. (1991) wrote that the imagery system also includes sounds and feelings, both tactile and emotional. Paivio (1983) said

that images include emotion and motivation, and that imagery was the connection between emotion and cognition. Aylwin (1985), on the other hand, said that cognition and emotion are both part of the image created. Plutchik (as cited in Fleckenstein, 2002) wrote that images are part of mental maps humans create and can elicit emotional behavior. Thus, how we feel about an experience is part of the complex image we create of that experience. Based on the descriptions of imagery I included in this section, for the purpose of this study imagery should not be thought of as a static picture as the name of the imagery strategy (Snapshot) suggests. Rather, in this study, imagery includes all the sights, sounds, feelings (both kinesthetic and emotional) experienced by the students while engaging in the imagery strategy instruction.

In a discussion of developing concepts through imagery, Innocenti (2002) mentioned the physical experience necessary to create the image. We use our senses to perceive experiences and develop an image for understanding. Innocenti described passages from *Thinking in Pictures: My Life with Autism* by Temple Grandin (1996), an author with autism, to support the necessity of images to comprehension. Grandin stated that as a child she easily understood concrete nouns because they were linked with images of the nouns. However, she had more difficulty with other parts of speech and learned to link those difficult words to pictures. Grandin described conjuring up an image for the word "under" by picturing herself going under a table in the cafeteria during an air-raid drill. While Innocenti's assertion that movement is connected to imagery is based on Grandin's personal experience and not empirical data, it does suggest an interesting connection related to my study. Through this discussion, we can see that movement, or

visualizing movement, is related to creating imagery; we can also see that imagery is related to understanding and to how individuals may store and retrieve knowledge.

Since the 1970s, there has been an ongoing debate about visual mental imagery and whether it is a form of mental representation; this debate began during the period of psychology where there was a shift from a behaviorist to a cognitive perspective (Thomas, 2012). Pylyshyn (1973), a leading supporter of propositional theory, argues that all representations, i.e., both images and verbal information, are stored as propositions in memory. Propositions are a way describing relationships between concepts that do not use words or pictures (Pylyshyn, 1973). On the other side of the debate is Kosslyn's "quasi-pictorial" theory that contends that an image is stored as a "deep representation" in long-term memory; deep representations are similar to computer codes (Thomas, 2012). When an image is recalled, the codes are visible as an actual image on the visual buffer; this model is similar to how real computer graphics work (Thomas, 2012).

Today, most psychologists argue for a combination of propositions and imagery (Anderson & Bower, 1973; Talasli, 1990). For the purpose of this study, I agree with the combination view and reject the strict propositional view, in part because of the consensus in the literature and in part because in my experience both as a student and a teacher, I find that often images more than words remain with learners and contribute to the recalling of other knowledge. My definition of imagery includes a mental picture or video, as well as all the sensory, emotional, and motivational information related to the picture.

Dual Coding Theory and Reading

Theories of reading, developed from a large body of research on cognitive events, have been used to explain how information, such as text, is processed and stored in memory; these include bottom-up (originated from text), top-down (derived from a reader's memory), and interactive models (bottom-up and top-down processes impact each other) (Sadoski & Paivio, 2001). Currently, the leading theories are interactive (Sadoski & Paivio, 2001). As part of their argument to support their interactive dual coding theory as a model of reading, Sadoski and Paivio compared their theory to two well-known interactive models.

Rumelhart's (1977) well-known parallel distributed processing model is made up of multiple layers that are all involved in reading. For example, text perception and reading comprehension are produced on various levels at the same time and can impact each other (Sadoski & Paivio, 2001). Sadoski and Paivio stated that the dual coding theory of reading is comparable to the parallel distributed processing model in regards to verbal processing, but dual coding theory also utilizes imagery. In addition, unlike the parallel distributed processing model and its multiple levels of processing, the dual coding theory is easier to test empirically because it has fewer processes (Sadoski & Paivio, 2001).

Another well-known interactive theory of reading is Kintsch's (1988, 1998) construction-integration model. As described in Kintsch and Rawson (2005), the model's first level, called construction, is the basic word and phrase decoding of text on a page. The second level is Kintsch's (1988, 1998) construction-integration model. In this level, words and phrases are combined into propositions, which together form the

microstructure of the text (Kintsch & Rawson, 2005). To connect these propositions, it is often necessary for the reader to make inferences (Kintsch & Rawson, 2005). Once the reader makes sense of the microstructure of a text, the macrostructure is formed by recognizing relationships between sections of the microstructure. The second stage of integration then begins where the textual propositions are checked against context.

These first two levels can be equated to the verbal code processing in the dual coding theory. Although as Sadoski et al. (1991) pointed out, in dual coding theory there is no delineation between reading individual words and phrases and creating propositions between them as there is in Kintsch and van Dijk's (1978) model, the verbal code described in the dual coding theory doesn't prevent propositions and is sufficiently explained by the intra-system interactions. Sadoski and Paivio (2001) argued that the propositions in the construction-integration model are abstract and monitored by abstract processes. Imagery can be included in the construction-integration model but would go through the text-based propositional phase first. As I explain later in this chapter, Sadoski and Paivio believe that all images retain some of their physical qualities during processing so using text for processing images, as in the construction-integration model, would contradict their belief. For this reason, while imagery can be included in the construction-integration model, Sadoski and Paivio concluded that their dual coding theory model of reading better explains imagery in reading.

The third level, and the addition of which helped Kintsch and van Dijk's (1978) reading model support dual coding theory, is the construction of the situation model. While the first two levels depend on the text, in the situation model of the text, the reader utilizes the microstructure and macrostructure and merges it with related prior knowledge

of the topic (Kintsch & Rawson, 2005). The important distinction is that unlike the first two levels, the third level is not constrained within the verbal domain; rather, the third level involves the non-verbal domain as described in the dual coding theory. Thus, the prior knowledge used to create the situation model contains imagery, which according to the dual coding theory, is also made of emotions, sounds, and personal experiences.

Unlike the previous models, Paivio's (1969) dual coding model includes imagery at all levels of the comprehension process. According to Sadoski and Paivio (2001), imagery has "no functional significance" (p. 135) in the interactive models that do include it. It is Sadoski and Paivio's position that dual coding theory "explains all the reading phenomena addressed by triple coding theories and more, including neuropsychological evidence of processing differences for concrete and abstract text and the powerful, ubiquitous experience of imagery during the reading of a variety of text types" (p. 136). Because imagery is essential to the strategy used in my study, Sadoski and Paivio's dual coding theory of reading is the best model to explain what happens on the cognitive level while my students are reading.

According to dual coding theory, both images and verbal codes are used to represent information. The two types of codes were described in Chapter 1. I will now discuss the organization of the systems and research that supports the dual code model. According to Paivio (1969), the two codes process and organize information differently. Verbal information is processed in a sequential manner, whereas non-verbal information is "organized more in the form of holistic nested sets with information available for processing in a synchronous or parallel manner" (Sadoski et al., 1991, p. 473). In a study that supports this idea, Paivio (1969) showed a quick series of images and a quick series

of words to participants. They were then asked to recall as many as they could, first in any order, and then in the sequence in which they were presented. The images were more easily recalled than the words in a random order, and the words were more easily recalled than the images in sequence. The study supports the notion that images are processed in a holistic manner and symbols are processed in a sequential manner.

Although the two coding systems process and organize information in different ways, the systems do talk to each other. Sadoski et al. (1991) described intra-system (or associative) and inter-system (or referential) organization for both verbal and imagery coding systems. In intra-system organization within the imagery side, mental images suggest associated images. For example, a mental image of a beach may also evoke the scent of sunscreen or the feeling of a relaxing afternoon watching surfers. On the verbal side, associative organization works when one word or phrase calls to mind other words or phrases that have become associated with the original word or phrase over time through learning or experience. For example, hearing the name *Vygotsky* could lead an education student to think of the phrase *zone of proximal development* or the word *intersubjectivity*. In both sides, the organization that leads to the recollection of other words or images is what Sadoski et al. (1991) call "probabilistic" (p.473). This means that particular words or images are more connected through experiences or associations than others. For example, it is unlikely the image of the beach would lead to the recollection of snow. However, depending on how the education student learned about Vygotsky, it is possible that hearing that name could lead to Piaget. Clearly, the associations depend on experiences.

In the inter-system, or referential, organization the two sides work together (Sadoski et al., 1991). A mental image may evoke language, and vice versa. For example, if a student in Hawai‘i hears the words *Venice Beach* she may recall an image of a Hawaiian beach and all her feelings associated with that even though she may have never been to Venice Beach. On the other hand, if a student in Wyoming hears the words *Venice Beach*, she may have no image of that and therefore would only recall verbal associations, such as ocean or boardwalk. In some cases there are many verbal and imagery connections, while in other instances there are no connections. Again, just as in the associative organization seen within a system, these referential connections depend on learning and experience. As Sadoski et al. (1991) stated, “these referential interconnections allow for the great flexibility noted in human cognition” (p. 473).

There is one more consideration in regards to the organization of the two systems. Dual coding theory also maintains that mental images preserve some of their physical qualities; thus, the modality through which the image is coded is important (Sadoski & Paivio, 2001). For example, when participating in the experimental condition, my students saw a verbal code for the word *yield*. The verbal code could have been any of the letters in the word or the entire word. The visual non-verbal code could have been a mental image of a triangular red and white traffic sign. This dual coding applies for all sensory input systems; however, while the visual (sight), auditory (hearing), and haptic (touch) modalities can have both verbal and non-verbal encoding, the gustatory (taste) and olfactory (smell) modalities can only have non-verbal coding because while we can experience tastes and smells, they are not coded in language (Sadoski & Paivio, 2001).

Input that is coded into two different modalities does not necessarily need to be processed together (Sadoski & Paivio, 2001). Continuing with our example of the word *yield*, a student may recall the visual non-verbal triangular red and white traffic sign without recalling the auditory coding of the pronunciation of the word. It is easy to perform two simultaneous tasks in different modalities but difficult if the tasks are in the same system. For example, using your body to create a physical image (haptic system) while discussing it (auditory system) is rather easy; listening to someone talk while talking yourself is difficult.

Imagery research. Research on using imagery and mnemonics, a device used to aid remembering, supports the dual code model. Eggen and Schellenberg (2010) describe a number of mnemonic techniques that utilize imagery. The pegword method entails learners memorizing objects that rhyme with numbers, then creating an image of what they need to memorize and linking it with the object representing the number. For example, if one is sun and two is glue, someone wanting to remember to purchase bananas and apples at the store would visualize the sun holding a banana and glue holding two apples together.

A similar strategy, called the method of loci, asks that learners imagine a familiar scene, mentally walk around the scene while stopping at important objects, and then revisit the scene while linking the item to be learned with an important object.
A method called key-word requires learners to think of an English word that sounds like a to-be-learned foreign word; then they link an image of the foreign word put together with an image of the English word. Schunk's (1991) example of the key-word method involves the Spanish word pato (duck); a learner would think of a pot because it sounds

like pato and would then conjure an image of a duck with a pot on its head as a way to remember that pato means duck in Spanish. In addition to success with foreign language learning, this method has also been used effectively with other academic content (Baleghizadeh & Ashoori, 2010; Brown, & Perry, 1991; Ellis & Beaton, 1993; Pressley, Levin, & Delaney, 1982; Wolgemuth, Cobb, & Alwell, 2008).

In a fourth mnemonic approach called the link method, an individual imagines the items to be remembered by linking them. For example, to remember what to take when leaving the house, I might visualize my son holding my keys, purse, phone, and water bottle.

Schunk (1991) points out that all these successful mnemonic techniques employ rehearsal and the relating of to-be-learned information to prior knowledge, both valid principles for learning and instruction. Although Snapshot, the imagery strategy used in my study, is not a mnemonic technique, the principles involved in these mnemonic learning strategies are also utilized in Snapshot. Rehearsal occurs as students show the to-be-learned word over and over again in different images; for example, the instructor will coach students to show a word as one image and after a discussion, students are coached to show the same word in a different image. In Snapshot, part of rehearsal is elaboration, which occurs when students build more links between what they are learning and their prior knowledge. Prior knowledge is used as students place the new word in familiar situations to create an image; for example, since the vocabulary words are usually taken from a reading passage, students are coached to consider their own context that is similar to one in the reading passage and place the vocabulary word in that context. This use of imagination comes fairly easy to most children. In fact, research has shown that children

use imagery more readily than adults, and that adults are actually slower to respond when asked to use imagery instead of verbal codes (Kosslyn, 1980).

Studies have shown that mnemonic devices using mental imagery can be a successful method of storing and retrieving information (Dewhurst & Conway, 1994; Johnson-Glenberg, 2000; Massen, Vaterrodt-Plunnecke, Krings, & Hilbig, 2009; J. Levin, M. Levin, Glasman, & Nordwall, 1992). Dual coding theory provides a clear reason for that success by explaining that input can be processed both as verbal and non-verbal codes whose organization allows for the two codes to work together. Research on the use of imagery to teach reading comprehension and vocabulary further support dual coding theory.

Using imagery to teach reading. Research has shown that vocabulary is an integral part of reading comprehension and that teaching vocabulary positively impacts reading comprehension (Anderson & Freebody, 1981; Cunningham & Stanovich, 1997; Davis, 1944; Nation, 2009). The use of imagery to teach reading is not as well established, but there are some studies. In this section, I discuss studies that suggest the effectiveness of using imagery on both reading comprehension and vocabulary. Although my research used only vocabulary as a measure, I include a review of both reading comprehension and vocabulary for two reasons. First, vocabulary learning falls under the reading comprehension umbrella; second, the number of studies focused on the impact of imagery on vocabulary learning is rather small. Including reading comprehension provides a more complete picture of the effectiveness of imagery in learning to read.

***Reading comprehension*.** While the number of studies looking at imagery training's impact on reading comprehension is not large, there are studies that cite the use

of imagery training in improved reading comprehension. Rose, Androes, Parks, and McMahon's (2000) experimental design was among the first to offer a strong connection between drama, to which imagery training is related, and reading comprehension. In their review of literature, Rose et al. concluded that there is an overall lack of rigor in the drama-language arts research. Prior to this study, while there had been research on drama and language arts, very few of these studies reported valid measures or offered a strong theoretical reasoning for their results (Rose et al., 2000). For these reasons, Rose et al. investigated a reading program that used drama techniques that applied the research on imagery and memory. Using an experimental design, Rose et al. found that the drama based approach improved student comprehension scores on the Iowa Test of Basic Skills more than a traditional reading approach.

Pressley (1976) trained eight-year-old students in forming mental images by presenting them with a reading passage and instructing them in creating a mental image of the content after reading. Students were also provided with models of good images. The imagery training was only a few minutes long and the passages became longer as the study progressed. The final test was a 950-word passage. Pressley found the group that used images performed better on questions after reading a story than students who did not learn to use images.

Finch (1982) examined the effects of mental imagery on fifth-grade students' reading comprehension who were either above or below grade level readers. One group was told to create pictures in their heads to remember what they read; the other group was told only to remember what they read. Students were then tested with a cued test and a free recall test. Finch found significant differences between the groups on the cued test

only. However, Finch also asked students if they used mental imagery while reading. While all the students in the imagery group reported creating mental images while reading, it is interesting to note that in a follow-up questionnaire 90% of the above average readers and 65% of the below average readers in the control group also reported using mental imagery while reading. This suggests a reason for why there was no difference on the free recall test as many students in the control group already used mental imagery. Perhaps more importantly, this result suggests that fewer below average readers use mental imagery than do above average readers and would likely benefit from mental imagery instruction.

Gambrell and Jawitz (1993) studied the effects of teaching students to utilize both mental imagery and text illustrations. They compared four groups: using mental imagery, using text illustrations, using both mental imagery and text illustrations, and a control with no intervention. All students read a narrative story to themselves. Gambrell and Jawitz found that students who looked at text illustrations and made their own images had significantly better comprehension than students who constructed images without looking at illustrations, looked at text illustrations while reading, and rewrote the story as was the case for the control group. Gambrell and Jawitz state that their findings support "an imagery-illustration interaction theory, which posits that readers use mental imagery and text-relevant illustrations in dynamic, flexible, and interconnected ways that result in enhanced comprehension" (p. 270). However, it is also interesting to note that the students who created images without looking at illustrations had better story recall than the two groups that did not make images. This suggests that elaboration, or the creation

of images, which are likely related to prior knowledge, help comprehension more than only looking at a text's images or just using verbal coding.

Borduin, Bourdin, and Manley (1993) investigated the effects of training in creating imagery on second grade students' inferential reasoning and detailed memory of a text. One group of students was trained in creating mental imagery by creating a mental image of the text and then making a visual and verbal depiction of their mental image; two groups participated in a directed reading group and received corrective feedback from the teacher; the final group read the text on their own with no instruction from a teacher. The students were then tested immediately after training and again six weeks later. Results showed that students in the imagery group had higher inference scores and a marginally significant effect for the detailed memory of the text than the other groups at the first posttest. It is important to note that while these results do support the use of imagery in teaching reading, this study was conducted with only 28 children.

Based on years of clinical work helping struggling readers through a sensory-cognitive approach, Bell (1991) described a belief that "imaging is a sensory link…[that] connects us to incoming language and links us to and from prior knowledge, accesses background experiences, establishes vocabulary, and creates and stores information in both long term and short term memory" (p. 5). To test this belief, Bell worked with participants in her clinic for an average of 47 hours to improve their language comprehension through an imagery only treatment. She found significant effects on the Gray Oral Reading Test Revised and the Descriptive Tests of Language Skills of the College Board Reading Comprehension subtest; she also found a 2.53 average gain in

mental age on the Detroit Tests of Learning Aptitude, Oral Directions subtest (Bell, 1991).

Bell (1991) also reported results from the Chance Program, a program for at-risk college students who had low reading comprehension scores, which aimed to develop their imagery as a way to improve their comprehension. Students in this program also made statistically significant gains on the Nelson-Denny Comprehension and Vocabulary tests and the Descriptive Tests of Language Skills of the College Board, Reading Comprehension subtest; in addition, their grade point averages rose by 11% (Bell, 1991).

While all the participants in Bell's studies were voluntary and considered struggling readers, these gains do suggest that improving imagery could help improve reading comprehension. To explain her results, Bell (1991) cites Paivio's dual coding theory extensively and suggests that while it is assumed that individuals automatically use both visual and verbal coding, perhaps that is not the case and individuals need to be directly taught to use imagery.

Though they vary in their designs and approaches to measure comprehension, all these studies support a dual coding theory of reading.

Vocabulary. Although they are fewer in number than the imagery and reading comprehension studies, a number of studies support the use of imagery to enhance vocabulary learning. In Smith, Miller, Grossman, and Valeri-Gold's (1994) study of 62 university students, students in four reading classes were either in a class that provided vocabulary with definition and sentence only or in a class that provided vocabulary with definition, sentence, and image. Vocabulary words were not content specific; rather, the researchers developed a list of 45 words from Dale and O'Rourke's (1981) *The Living*

Word Vocabulary. The list included 15 words each of nouns, verbs, and adjectives. All words were considered to be unfamiliar to over 50% of incoming college students. Pre-assessments showed there were no significant differences between groups in vocabulary achievement. Over a three week period, each class was given 15 words per week; students copied the vocabulary information from the board and were quizzed weekly on the 15 words. At the end of the three weeks they took a posttest; they took another posttest three weeks later. Results were analyzed in a two-tailed independent t-test. On the first posttest, the classes that included an image scored significantly higher than the classes that only had the definition and sentence. This result was surprising to the authors who hypothesized that perhaps the longer time spent copying the vocabulary information, as well as the physical experience drawing the image, impacted the results. On the second posttest, the classes that included an image again scored significantly higher than the other classes. They concluded that the use of a visual image supported long-term memory of vocabulary because it provided an extra cue for recall.

Cohen and Johnson (2010, 2011) recently published two studies that looked at how imagery interventions impacted students' science vocabulary learning. In Cohen and Johnson's (2010) first study, 15 second-grade students were assigned to one of three interventions: word only, dual coding (word paired with image) and image creation (students created a mental picture of the word and then drew it) for vocabulary instruction; the instruction occurred at three different times and each group of five students participated in each intervention. Because of the students' ages, the authors hypothesized that the dual coding intervention would produce the best vocabulary learning; the authors stated that the image creation would likely be too difficult for the

students. Using a one-way ANOVA, there were no significant differences between the interventions. However, the mean for the dual coding group was higher than the image creation group, and the image creation group mean was higher than the word only intervention. When the analysis was broken down further to look at types of words, the image creation group scored significantly higher than the word only group on science words. Although the small sample size likely influenced the outcome of this study, one interesting point brought up by the researcher was the difficulty in getting the second-grade students in the image creation group to work on their own. As young students often do, these study participants looked at their neighbor's work, making comments, and sometimes changing their own drawings. The authors of this study mentioned that as a limitation; however, in my study, students are expected to view the images of their classmates, comment on them, and possibly alter their own images based on the discussions.

Cohen and Johnson (2011) further tested their imagery interventions on 89 fifth-grade students as they learned new science vocabulary. In addition, in this study they also measured students' depth of processing of the science vocabulary. Students were randomly assigned to one of four intervention groups: picture presentation (a word was presented with a picture); image creation picture (students were shown a picture and instructed to draw it); image creation no picture (students drew a self-created image of a word); and word only. The authors hypothesized that the students who copied a picture would perform best on posttests, followed by the students who created an image and then the students who saw a picture presented with a word; the word only group was hypothesized to rank last of the four intervention groups. The authors explained that

because these were new science words, students in the image creation without a picture could potentially misunderstand the words. The authors were also interested in seeing if there was a difference in recall at a delayed measure between groups.

Students took two posttests on two different occasions, one day following instruction and again two weeks later. Multiple analyses were run to test the hypotheses, including repeated measures and one-way ANCOVA with vocabulary age equivalent as a covariate. There were significant differences between the interventions at both time periods. The main hypothesis about using imagery to learn new science words was supported, prompting the authors to conclude that including imagery is important for vocabulary learning. The authors further stated that there were no significant differences between the two image creation groups, suggesting that "having to create an image in one's mind is helpful in facilitating memory for vocabulary, and adding the extra presentation of a picture may not always be necessary" (p. 946); the creation of the image is what's important. In regards to the delayed measure, the differences were still significant between interventions. The authors conclude that this demonstrates that utilizing imagery helped students deeply encode the words into long-term memory.

Dufflemeyer (1980) conducted a study to test the following hypothesis: an approach to teaching vocabulary that focuses on experience with a word should be more effective for learning a word's meaning than an approach that does not focus on experience. Because this study is similar to mine, I describe Dufflemeyer's study in detail. The study participants were 56 college students who were randomly assigned into one of two groups—control and experimental. After being assigned into groups, the students took the Nelson-Denny Reading Test form C to further divide into low, middle,

and upper reading comprehension designations. In the experimental condition, students performed skits using words from the Nelson-Denny form A. The skits were meant to convey the meaning of the words. The skits were followed with questions by the investigator about the words. Finally, the students provided personal experiences to convey meanings of the word. In the control condition, students used a traditional approach to studying words from the Nelson-Denny form A. They learned about words through context clues, structural analysis, and dictionary usage. For both conditions, the final measure was an investigator-constructed paragraph-to-word test in which the students had to read five paragraphs and match each with one of the ten words studied.

An ANCOVA analysis was run using the investigator-constructed posttest as the dependent variable, treatment and reading ability (low, middle, upper) as independent variables, and vocabulary and reading comprehension pretests as covariates. The results showed that at all three reading abilities, students in the experimental group scored much higher than students in the control group. In addition, the standard deviation of the experimental group was smaller than that of the control group. A one-tailed *t* test showed that all but one of the mean-score differences were statistically significant. The implication of this study is that using drama to introduce students to vocabulary and help them connect the word to personal experience, while both actively processing and using movement, results in better overall learning of the word than a traditional approach to learning vocabulary.

Conclusion

Prior studies have demonstrated that the use of classroom drama has a positive impact on the reading comprehension of the texts that were acted out; in addition, the

positive effect transferred to texts that were not acted out (DuPont, 1992; Hetland & Winner, 2001). Based on two evaluations of arts strategies from the program that instructs teachers to use Snapshot, there is a need for a better-designed study that takes the evaluators' recommendations into consideration. This study would utilize only one effective arts strategy, implemented by a teacher comfortable with the instruction who would apply the strategy frequently. Finally, this study would focus on measuring either vocabulary or character.

Research shows that vocabulary knowledge is definitely linked to reading comprehension (Davis, 1944; Anderson & Freebody, 1981). Vocabulary instruction should take place (National Institute of Child Health and Human Development, 2000) and there are many factors to consider when planning instruction, including what it means to know a word (Beck et al., 1987; Cronbach, 1942; Perfetti, 2007) and which instructional strategies work best for particular situations (Graves, 2006; Kame'enui & Baumann, 2004). Teaching individual words is just one recommended approach. Snapshot, the imagery strategy I studied, teaches individual words through the use of mental imagery. Mental imagery includes information from all the sensory systems as well as from emotions and culture (Alwyin, 1985; Fleckstein, 2002; Sadoski et al., 1991). Although there have been debates about whether imagery truly is a separate form of information storage (Driscoll, 2000; Schunk, 1991), dual coding theory presents a strong argument for imagery's inclusion (Schunk, 1991). Dual coding theory has been established as a general theory of cognition and is now also supported as a reading theory (Sadoski & Paivio, 2001). Early research on mnemonics, as well as more recent research

on imagery's impact on reading comprehension and vocabulary learning, further supports the dual coding theory of reading.

The studies I reviewed demonstrate the connection between imagery and reading (Bell, 1991; Bourdin et al., 1993; Finch, 1982; Gambrell & Jawitz, 1993; Pressley, 1976; Rose et al., 2000). However, in the studies that focused on the use of imagery to support vocabulary development, there were some pieces of each study that could be improved. Smith et al.'s (1994) study only provided an image with the vocabulary and did not allow for image creation. Cohen and Johnson (2011) concluded that it was the creation of imagery that impacted vocabulary learning; their studies included image and image creation. However, in both studies the authors cited generalizability as a limitation because the studies' participants were all Caucasian students at a private school. Dufflemeyer's (1980) study, while providing extensive support for my study, has two limiting issues. First, it was conducted with college students and therefore, the results may not generalize to a younger population of students. Second, the intervention appeared to be quite time consuming, requiring a lot of focus by students, and likely is inappropriate for elementary or middle school classes. Finally, the studies conducted by Smith et al. (1994) and Cohen and Johnson (2010, 2011) included visual pictures, not drama. While results do suggest that imagery impacts vocabulary learning, aside from Dufflemeyer's (1980) study, more research is needed on the dramatic arts.

The Arts First Windward Research Project (Brandon, et al., 2007) and the Arts and Literacy for All Project (Brandon, et al., 2011) evaluations called for studies like mine to investigate the effectiveness of arts strategies in teaching reading. My study of an imagery strategy focused on teaching vocabulary will lend further support to dual coding

theory and the use of dramatic arts to teach vocabulary. Finally, it is a vocabulary strategy appropriate for elementary and middle grade learners' needs and classroom situations.

CHAPTER 3

METHODS

Previous studies have shown that imagery is an effective way to teach reading and vocabulary (Bell, 1991; Borduin, Bourdin, & Manley, 1993; Cohen & Johnson, 2010; Cohen & Johnson, 2011; Dufflemeyer, 1980; Finch, 1982; Gambrell & Jawitz, 1993; Pressley, 1976; Rose et al., 2001; Smith et al., 1987). Dual coding theory, which explains imagery as a separate form of information storage (Schunk, 1991), has been proposed as the basis for imagery's effectiveness in teaching reading. The goal of my study is to add to the literature supporting dual coding theory as a theory of reading. In addition, although arts training has been linked to language development (Dunbar, 2008; Petitto, 2008; Wandell et al., 2008), there is a lack of literature studying the impact of the dramatic arts on reading.

This study aims to answer the research question and sub-question: Do students trained in an imagery strategy to learn vocabulary have higher vocabulary scores on a norm-referenced reading test than students who learned vocabulary in a traditional way? The following sub-question is answered: Do the students trained in an imagery strategy to learn vocabulary retain words longer than students trained in a traditional strategy?

The following hypotheses support my research questions that students trained in an imagery strategy have higher vocabulary scores than students who learned vocabulary in a traditional way and that the students trained in the imagery strategy retain vocabulary longer than students trained in traditional strategies. I hypothesized that in the first treatment-control cycle, the treatment group would score higher on the posttest than the control group at a statistically significant level. I hypothesized that in the second cycle,

when both groups received the treatment, there would be no significant difference on posttest scores of the items taught with the treatment. However, I hypothesized that the treatment group would score higher at a statistically significant level than the control group on items taught in the first cycle being tested two months after the instruction.

Participants and Setting

This study was conducted in my two sixth-grade English classes at University Laboratory School (located on the campus of the University of Hawai‘i at Mānoa) in the second semester of the 2010-2011 school year. Students at this school are randomly selected from the stratified pool of applicants to represent a cross section of the state's public school population's ethnic distribution, socio-economic status, and achievement test scores. The ethnic distribution of this class, as reported by parents, is 2% Black, 7% Caucasian, 7% Chinese, 18% Filipino, 5% Hispanic, 4% Indo-Chinese, 18% Japanese, 2% Korean, 2% Micronesian, 25% Part-Hawaiian, 2% Portuguese, 2% Samoan, 2% Tongan, and 4% Mixed/Other. The socio-economic distribution of this class, according to parent education and employment, is 24% upper class, 20% upper middle class, 38% lower middle class, and 18% working class. Grade 6 is considered the main intake year as 46 new students are selected to join the 10 students moving up from the elementary school. A total of 28 girls and 28 boys were in the two classes.

The University Laboratory School, in conjunction with the Curriculum Research & Development Group at the University of Hawai‘i at Mānoa, serves as a testing and developing site for curriculum and school innovations. The school annually requests parental consent as part of its ethical practices in conjunction with the Institutional Review Board (IRB) and Human Studies Program at the University of Hawai‘i at Mānoa.

As a teacher-researcher, I applied for, and received, a separate approval from the Human Studies Program for this research. Students and their parents received a letter describing the project and the opportunity to decline participation; all students and parents consented.

Sample

The random assignment of students to groups in this experimental design allows for the results to be generalized the population of applicants and perhaps beyond. In addition, the uniqueness of having a cross-section of students mirroring the state's public school population adds to the validity of the interpretation of the study's results.

Sampling Procedure

For this experimental design, the 56 sixth graders enrolled in the school were randomly assigned to my two English classes for the 2010-2011 school year. Fifty-six students began the school year but one left before this study was conducted. The random assignment was stratified according to composite stanine scores at three levels: scores of 1-3, 4-6, and 7-9. The composite stanine is an average of the student's math and reading scores. The stanine data are available in the student records that previous schools send when a child transfers schools.

Students were randomly assigned using the following procedures:

1. Arrange students on separate Excel worksheets according to composite stanine, i.e. all the students with composite 3 stanine on one sheet; all the students with composite 4 stanine on one sheet, etc.
2. Sort the rows within stanine by gender and then alphabetically by last name within gender.

3. Assign students to class groups within each stanine according to their order on the list: Boy 1 and Girl 1 in Class 1; Boy 2 and Girl 2 in Class 2; Boy 3 and Girl 3 in Class 1, etc. Some stanine groups had odd numbers of boys and girls. The remaining students were not assigned until the very end as explained in Step 5.
4. Assign students from the ends of the distribution. Because this group of participants represents the normal curve for stanines, the ends of the distributions contain a small number of students. Therefore, for Stanines 3 and 9, two of the three students from each of the two stanines were assigned to the same class to balance out the numbers of students across distributions.
5. Assign remaining students from Step 3. These students were listed on a separate Excel worksheet. They were first sorted by stanine, then by gender, and finally by last name within stanine and gender. Then they were assigned to classes according to their order on the list.
6. Check work. Class groups were first checked for gender to make sure there was an even number in each class. Next classes were checked by stanine level. While at the individual stanine levels it is somewhat uneven, using the commonly accepted below average (Stanine 1-3), average (Stanine 4-6), and above average (Stanine 7-9) categories, there was an almost even distribution among the classes.

Measures

To answer my research questions, I used the *Stanford Achievement Test Series*, Tenth Edition (SAT 10), Intermediate 3 (for grades 6.5-7.5), Form A, a nationally norm-referenced test. The test has seven sections—Reading, Mathematics, Language, Spelling, Science, Social Science, and Listening. The goal of the SAT 10 is to supply an evaluation

that provides an accurate representation of a student's knowledge and abilities (*Technical Data Report*, 2004). According to the SAT 10 *Technical Data Report*, Pearson's conclusions about validity are based on "test content, response processes, internal structure, relationship to other variables, convergent and discriminant analysis, test criterion relationships, [and] consequences of testing" (p. 45). Studies on the SAT 10 have demonstrated strong support for its validity (SEG Research, 2009). According to SEG Research, a "content expert review found strong alignment with important Reading skills…[and s]trong relationships were found between the SAT 10 and other measures of Reading ability" (p. 17). Pearson's *Technical Data Report* provides reliability data for all SAT 10 subtests at every grade level; the KR20 reliability coefficient for the reading vocabulary section of the Intermediate 3 Form A is 0.84, which indicates a high level of internal consistency.

The vocabulary portion ($N = 30$) in the reading section of the test is split into three sub-sections. I only administered the two vocabulary sub-sections that focus on synonyms ($n = 12$) and context clues ($n = 10$). The third section focuses on multiple meanings of words. It would be meaningless to teach these words as they are common words, such as "long" and "charge." These simple words would not be appropriate for the intervention. However, the words in the sections that test synonyms and context clues are more challenging, such as "abrupt" and "mallet," and would be words the students may not deeply understand.

I chose the SAT 10 as my measure because of its high degrees of reliability and validity. In addition, I wanted to be able to measure learning on specific vocabulary items as opposed to general reading comprehension; selecting particular items for testing and

teaching allowed me to have tighter control on what was taught and measured, which could lead to an accurate picture of whether the type of instruction had an impact on the learning.

The SAT 10, Intermediate 3 (for grades 6.5-7.5) was used as one variable. The posttest scores were used as the dependent variable and the pretest scores were used as covariates. The SAT 10, Intermediate 2 (for grades 5.5- 6.5), was used as another covariate. The participants took this test upon their entrance to grade 6 in Fall 2010. For this covariate, I only used scores from the two vocabulary subsections that comprised my vocabulary measure. The final independent variable was group based on which type of instruction students received initially.

When the students returned to school after the holiday break in January 2011, I collected student pretest scores on the SAT 10 as a baseline measure. About one month after the pretest, students from Group A participated in the treatment condition and students from Group B participated in the control condition for a week of instruction on half the words selected randomly from the pretest. The one month between the pretest and instruction should have helped prevent any testing effects. About one month after the instruction, both Groups A and B were tested on the words they learned during instruction using the items from the pretest. Immediately after the testing for the first cycle, the second cycle began. In the second cycle, both Groups A and B received the treatment for instruction on the second half of items on the pretest. One month after the instruction, both Groups A and B took the entire test again. Thus, I have student scores (a) from Group A for the first set of words for both one month and two months after the treatment, (b) from Group B for the first set of words for one month and two months after

the control, and (c) from both groups for all the words for one month after both received the treatment. The two months between instruction and assessment in the first cycle should allow for an accurate measure of the vocabulary items stored in long-term memory.

I kept a researcher's journal to ensure fidelity both as a teacher and a researcher. As the classroom teacher, I had total control over the content and methods used in my classroom. I took notes after each class to record both the events and my thoughts on the events. I also made audio recordings of each class session to reference in the future.

Research Design

This study used a randomized control experiment design, which allows a causal inference to be made based on the random assignment of students. It is assumed all study participants have differences that may threaten the validity of the study. However, random assignment distributes these differences randomly between groups, equating the groups and allowing for a valid estimate of variance due to the treatment condition (Shadish, Cook, & Campbell, 2002). Because I hypothesized that the treatment strategy would help students learn vocabulary better and in a more meaningful way, the treatment was applied to both groups. However, Class A, the treatment group, received the treatment strategy twice.

The following design schematic demonstrates my approach to answering the research question:

R O X_A O X_A O

R O X_B O X_A O

In this design schematic, X_A is the treatment using an imagery strategy to teach vocabulary, and X_B is the traditional approach to teaching vocabulary. Each cycle included the intervention and assessment, and took about five weeks to complete. Class A received the treatment for the entirety of two cycles. Class B received normal instruction for the first cycle and the treatment for the second cycle. This is to ensure that all students receive the imagery strategy instruction. This design provides for a control-group study in the first cycle, and maintenance-group versus new-treatment-group study during the second cycle. The length of this study should eliminate any maturation effects that could be a threat to the internal validity.

Intervention

I was the classroom teacher implementing the instruction and collecting the data. In June 2010, I was trained to use the imagery strategy during the Hawai‘i Arts Alliance summer institute for public school teachers. In the summer training provided by the Hawai‘i Arts Alliance, teachers represented kindergarten through high school. The particular training I received was geared toward secondary teachers (Grades 7-12). However, the strategies can be modified to be appropriate with any grade level. During the training, I wrote, presented, and received master teacher feedback on sample lesson plans for sixth-grade students.

In order to ensure the fidelity of implementation, the director of the Hawai‘i Arts Alliance and a trained rater of the teaching method observed me implementing the imagery strategy with one of my classes not involved in the study. The observations took place on two separate occasions. They rated my implementation using the 2010 version of the Quality of Arts and Literacy Program Implementation (QuALPI) protocol

(Appendix A) designed to rate teacher implementation of the strategies, and provided feedback about the overall strength of my implementation. Both observations were prior to the intervention and were done with regular classroom materials. Although there is no cut score to determine fidelity of implementation, in a paper describing the QuALPI protocol, Harrison, Brandon, and Lawton (2012) used ratings for seven case-study teachers to analyze reliability and validity of the instrument. Using multiple observations and raters, the seven teachers earned average scores of 2.4–4.35 on a scale of 1-5. I had two observations and two raters and earned an average score of 4.0. As Harrison et al. noted, some criteria were not observed by the raters, and therefore, could not be scored for those particular lessons. In my observations, each rater listed one criterion that was not observed. Regardless, with an average score of 4.0, I felt it safe to determine that I was implementing the imagery strategy with fidelity.

The intervention took place during normal class time in my regular classroom. Laboratory School class periods run for 45 minutes; the intervention occupied approximately 40 minutes of each class. During the first cycle in which Class A received the treatment and Class B received the control condition, instruction occurred over a period of three days. The first day of the intervention also included an introduction to each method, so the students only learned three vocabulary words that day. The next two days they learned four words each day.

During the second cycle where both classes received the treatment, instruction also took three days. The first day of instruction included reminders about the method for Class A and an introduction to the method for Class B. The students learned three

vocabulary words on the first day and four vocabulary words on each of the remaining two days.

Treatment. The imagery strategy used in this study is called "Snapshot." I followed the procedure described in the *Essential Arts Toolkit* (Hawai'i Alliance for Art Education, 2010). During Snapshot, students are given a prompt, such as an important vocabulary word and its definition, and they individually represent it using facial expressions or body position. Students then observe each other, describe what they see, possibly interpret what they see, and discuss other ways to represent the prompt. They also connect the prompt to personal experiences through discussion or in their minds. Once students understand and are comfortable with the basic procedure described above, the teacher helps them extend the representation. Students can be asked to add a line of dialogue or a thought bubble to their snapshot or someone else's image; they may join another person to do a partner snapshot; they may be asked to add some movement to their image and make a "five-second movie."

In order to carry out the assignment, students are constantly coached by the teacher. Because this intervention took place for approximately 40 minutes over three days for both cycles, it is impractical to report verbatim everything I said. However, below I provide an example script based on what actually occurred in the intervention, not including the portion where I introduced the method.

(The vocabulary words and their definitions are on the board in the front of the class. We have read through the definitions together and will begin Snapshot using the first word.)

Teacher: Imagine you were on the cay (we were currently reading a book called *The Cay* which is about being stranded on an island). What would you look like if you were about to *capture* something?

(Pause for students to think about how they can physically represent the vocabulary word "capture.")

Teacher: Now that you have your image in mind, I'm going to count down from three as you move into representing your image. Three…two…one…freeze! Now keep your body where it is but move your eyes so you can notice what others around you are doing.

(Pause for about ten seconds for students to do this.)

Teacher: Everyone off now and relax your bodies. So what did you see when you were looking at others?

(Allow students to report what they saw.)

Teacher: Let's try this again. This time I want you to represent "capture" in a different way. Think about how you can vary your level—can you get closer to the ground or higher up like you were capturing something in a tree? Can you change your facial expression or your body's position so we get a better idea of what you are capturing?

(Pause for students to think about how they can change their representation of the vocabulary word "capture.")

Teacher: Here we go! Three…two…one…freeze! Again keep your body where it is and move your eyes so you can see what others are doing.

(Pause for about ten seconds for students to do this.)

Teacher: Everyone off now and relax your bodies. So what did you see when you were looking at others? Let's also do some interpreting based on what you saw. After you tell

me *what* you saw, tell me what you think that person was doing in their image of "capture."

(Allow students to report what they saw and provide interpretations of others' images. Then move onto the next vocabulary word.)

Control. Normal vocabulary instruction used in this study included a presentation of the word visually and orally. Students then used a dictionary to find the part of speech and definition for the word. They also used the word in a sentence related to *The Cay*, the novel we were reading. This work was done individually. After all the students completed defining and using the words in sentences, we discussed the multiple word definitions as a class. A few students either volunteered or were selected to write a sentence on the board. As a class, we discussed how to make the sentences better. This is standard practice for learning vocabulary. This strategy focuses only on the instrumentalist hypothesis of the vocabulary-reading comprehension connection.

Data collection. Prior to the intervention and data collection, both classes took the SAT 10 pretest in August. Both Classes A and B followed the same data collection procedures at three separate times (Figure 1). The first set of data was collected approximately four weeks prior to the first intervention. The second set of data was collected approximately four weeks after the first intervention. The third set of data was collected approximately four weeks after the second intervention.

	SAT 10 Pretest August	Assessment 1 End January	Intervention End February	Assessment 2 End March	Intervention End March	Assessment 3 End April
Class A N = 27		22 words (Sets 1 and 2)	Imagery strategy 11 words (Set 1)	11 words (Set 1)	Imagery strategy 11 words (Set 2)	22 words (Sets 1 and 2)
Class B N = 28		22 words (Sets 1 and 2)	Traditional instruction 11 words (Set 1)	11 words (Set 1)	Imagery strategy 11 words (Set 2)	22 words (Sets 1 and 2)

Figure 1. Data collection and intervention schedule.

Each data collection began with the vocabulary assessment. Students recorded their answers on an answer sheet. For the first and third assessments, students used the SAT 10 testing booklet to take the vocabulary portion. For the second assessment, students used a separate testing sheet with half of the vocabulary questions from the SAT 10 testing booklet. Finally, during the second and third assessments, students wrote about the vocabulary words. They were instructed to write everything they knew and remembered about the words I provided.

Data Analysis

In order to measure the relationship between the imagery strategy instruction and learning, I chose to analyze the data using general linear modeling. While there are several ways general linear modeling can be conducted, including sequential and statistical regression (Tabachnick & Fidell, 2007), I decided that a standard multiple regression analysis was the best method to use for this study because it would show how much unique variance each of the three variables accounted for in posttest scores. Because this study aimed to demonstrate that imagery strategy instruction leads to better short- and long-term vocabulary learning, multiple regression analysis would provide the

amount of variance attributable to instructional group, allowing for a comparison of groups after the other variables are considered.

The dependent variable was the mean posttest score on items from the SAT 10 vocabulary test. The independent variable was the type of vocabulary instruction received, coded as 0 (for treatment) and 1 (for control). The covariates were the mean of pretest items from the SAT 10 vocabulary test taken during the intervention and the mean vocabulary score on an earlier version of the SAT 10 vocabulary test taken about six months prior to the intervention.

I ran three regression analyses to test my three hypotheses. The SAT 10 Intermediate 2 and group variables remained the same throughout the three analyses. For Analysis 1, which looked at which method was best for short-term learning, the data for the first set of vocabulary words taught were included (Pretest 1and Posttest 1). For Analysis 2, which also looked at short-term learning, the data for the second set of vocabulary words taught were included (Pretest 2 and Posttest 2). For Analysis 3, which looked at which method was best for long-term retention, the data for the first set of vocabulary words taught were included (Pretest 1 and Posttest 3).

In general linear modeling, it is important to consider which independent variables to select, as this will have an impact on the regression equation. In my case, the selection of independent variables was relatively straightforward. I used a pretest, which is a commonly used measure of learning; I included a SAT 10 vocabulary score from an earlier test to control for differences in prior vocabulary knowledge; finally, I included the instructional group to which each student was randomly assigned.

It is also important to consider the degree to which independent variables may be correlated with each other (Tabachnick & Fidell, 2007). If they are not correlated with each other, it is relatively simple to determine their contribution to the regression; however, Tabachnick and Fidell stated that if the independent variables are correlated, it is difficult to determine how the variance is shared among the different variables since it is possible one independent variable impacts another independent variable. In all three analyses in this study, the independent variables were at most moderately correlated, with the highest correlation being .63.

Prior to running the analyses, I performed routine data screening. There were no outliers in my data set. Singularity was not detected. After running the analyses, I looked at the shape of the residuals scatterplots to test the assumptions of normality, linearity, and homoscedasticity. In all three analyses it violated the assumption of linearity, which is seen in the curved shape of the scatterplots (Figures 1, 2, and 3). According to Tabachnick and Fidell (2007), failure to meet the linearity assumption weakens the regression analysis but does not "invalidate" (p. 127) it.

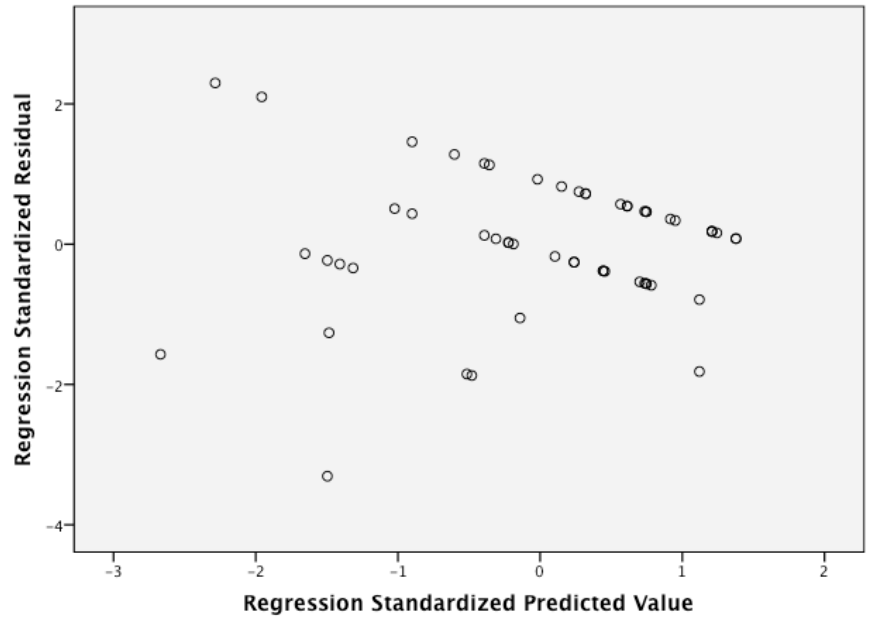

Figure 2. Scatterplot of regression residuals for dependent variable Posttest 1

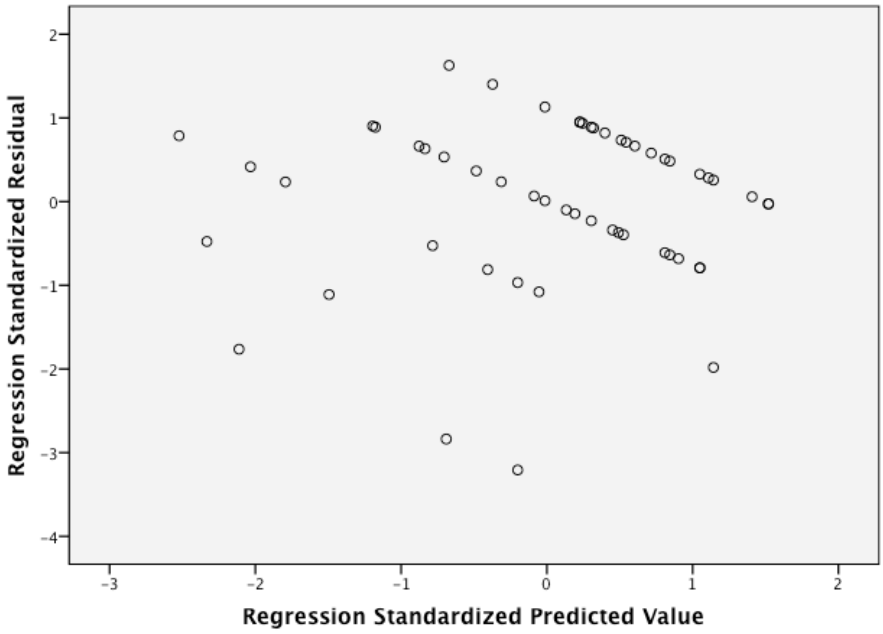

Figure 3. Scatterplot of regression residuals for dependent variable Posttest 2

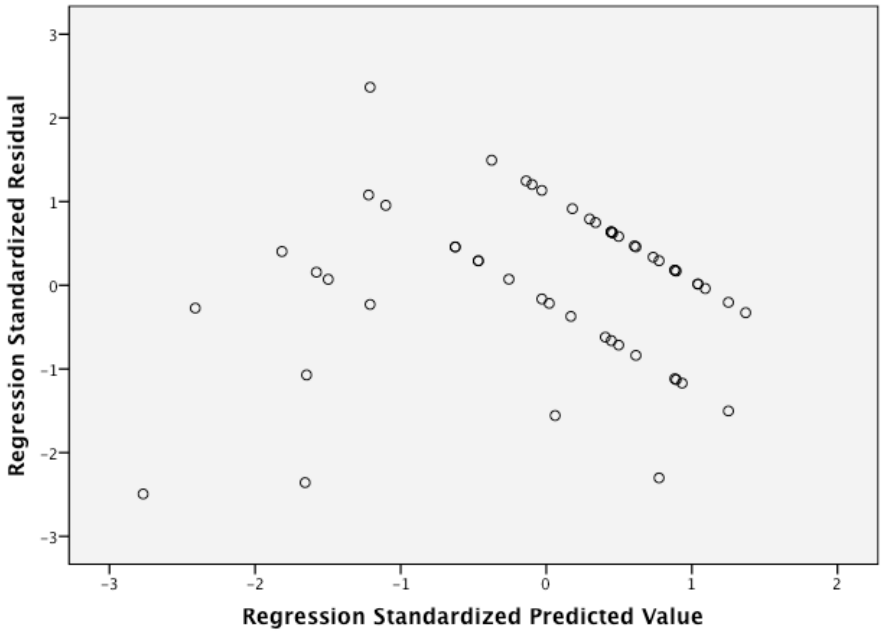

Figure 4. Scatterplot of regression residuals for dependent variable Posttest 3

CHAPTER 4
RESULTS

The research question: Do students trained in using an imagery strategy to learn vocabulary have higher vocabulary scores on a norm-referenced reading test than students who learned vocabulary in a traditional way, and sub-question, do the students trained in using an imagery strategy to learn vocabulary retain words longer than students trained in traditional strategies, were answered by comparing means and using multiple regression analyses. Table 1 shows the descriptive statistics for all variables included in the multiple regression analyses.

Table 1
Descriptive Statistics of All Variables by Group.

	Treatment ($N = 27$)			Control ($N = 28$)		
Variable	*M (SD)*	Skew	Kurt	*M (SD)*	Skew	Kurt
SAT 10	16.96 (2.72)	-.92	.64	17 (3.48)	-.82	.27
Pretest 1	9.33 (1.18)	-.41	-.65	9.21 (1.45)	-.56	-.52
Posttest 1	10.19 (1.18)	-2.06	5.22	10.04 (1.07)	-1.24	1.29
Posttest 3	10.41 (.84)	-1.35	1.16	9.88 (1.28)	-1.65	2.86
Pretest 2	8.27 (1.69)	-.84	.44	8.71 (1.58)	-.09	-1.23
Posttest 2	10.15 (1.03)	-1.47	2.34	9.89 (1.67)	-1.14	.93

Note. Pretest 1 items are measured on Posttest 1 and Posttest 3. Pretest 2 items are measured on Posttest 2.

Hypothesis 1

I hypothesized that in the experimental condition, the treatment group would score higher on Posttest 1 than the control group at a statistically significant level. To address the hypothesis, group means were compared and a regression analysis was performed.

A regression analysis was run with the mean Posttest 1 score as the dependent variable. The independent variable was the type of vocabulary instruction received, coded as 0 (for treatment group) and 1 (for control group). Covariates were the mean score of

Pretest 1 and the mean vocabulary score on an earlier version of the SAT 10 vocabulary test taken about six months prior to the intervention. The treatment group outperformed the control group, but contrary to my hypothesis, the results of the analysis showed that vocabulary instruction was not statistically significant. However, the overall model is statistically significant, accounting for approximately 28% of the variance in Posttest 1 scores, with both Pretest 1 and SAT 10 as significant predictors in the model (Table 2, Table 3).

Table 2
Test of Between-Subjects Effects (Dependent Variable Posttest 1).

Source	*SS*	*df*	*MS*	*F*
SAT 10	3.68	1	3.68	3.87*
Pretest 1	4.88	1	4.89	5.14*
Group	.20	1	.20	.21
Error	48.50	51	.95	
Corrected total	67.35	54		
$R^2 = .28$				

Note. **$p < .01$. *$p < .05$.

Table 3
Parameter Estimates for Posttest 1.

Parameter	β	Std. Error	*t*	95% CI
Intercept	5.82	.99	5.90**	[3.84, 7.81]
Group	.12	.26	.46	[-.41, .65]
SAT10	.10	.05	1.97*	[.00, .20]
Pretest 1	.27	.12	2.27*	[.03, .51]

Note. **$p < .01$. *$p < .05$.

Hypothesis 2

I hypothesized that when both groups received the treatment, there would be no significant difference on Posttest 2 scores. To address the hypothesis, group means were compared and an ANCOVA analysis was performed.

A regression analysis was run with the mean Posttest 2 score dependent variable. The independent variable was the type of vocabulary instruction received, coded as 0 (for treatment group) and 1 (for control group). Covariates were the mean score of Pretest 2 and the mean vocabulary score on an earlier version of the SAT 10 vocabulary test taken about six months prior to the intervention. The results of the regression analysis showed that the difference between the two instructional groups was not significant, which supports my hypothesis. The overall model is statistically significant, predicting 38% of the variance in Posttest 2 scores. Pretest 2 and SAT 10 scores were significant factors in the model (Table 4, Table 5).

Table 4
Test of Between-Subjects Effects (Dependent Variable Posttest 2).

Source	*SS*	*df*	*MS*	*F*
SAT 10	7.30	1	7.30	9.16**
Pretest 2	4.13	1	4.13	5.18*
Group	1.33	1	1.33	1.66
Error	39.89	50	.80	
Corrected total	64.00	53		
$R^2 = .38$				

Note. $^{**}p < .01$. $^{*}p < .05$.

Table 5
Parameter Estimates for Posttest 2.

Parameter	β	Std. Error	*t*	95% CI
Intercept	5.78	.78	7.41**	[4.21, 7.34]
Group	.32	.25	1.29	[-.18, .81]
SAT10	.14	.05	3.03**	[.05, .23]
Pretest 1	.20	.09	2.28*	[.03, .38]

Note. **$p < .01$. *$p < .05$.

Hypothesis 3

I hypothesized that in the experimental condition when measuring vocabulary recall from Pretest 1 to Posttest 3, which is a span of approximately three months, the treatment group would score higher than the control group at a statistically significant level. To address the hypothesis, group means were compared and a regression analysis was performed.

A regression analysis was run with the mean Posttest 3 score as the dependent variable. The independent variable was the type of vocabulary instruction received, coded as 0 (for treatment group) and 1 (for control group). Covariates were the mean score of Pretest 1 and the mean vocabulary score on an earlier version of the SAT 10 vocabulary test taken about six months prior to the intervention. Consistent with my hypothesis, the treatment group did score higher than the control group on Posttest 3 by .41 (Table 2). In addition, the change from scores on Posttest 1 to scores on Posttest 3 demonstrates that the treatment group improved their mean score by .22 where the control group decreased by .16. The regression analysis showed all three variables were significant factors, and there was a slightly significant interaction ($p = .047$) between the group and SAT 10 scores from the earlier version of the vocabulary test taken about six months prior to the

intervention. The overall model predicted 57% of the variance in Posttest 3 scores (Table 6, Table 7). This indicates that the dramatic arts technique was better for long-term retention of vocabulary words than the standard vocabulary method used by the control group.

The interaction between the group and SAT 10 scores suggests that particular reading levels, which in this study are indicated by vocabulary knowledge, may be affected differently by the type of instruction. To investigate this, I did two follow-up analyses. For the first analysis, I split the experimental group into three equal groups of 9 based on their reading level reflected by SAT 10 score. I then looked at mean gain score from Pretest 1 to Posttest 3. I found nothing significant. For the second analysis, I ran a correlation between the gain scores and the SAT 10 scores. Again, I found nothing significant. Thus, in this group, the students of various reading levels were not strongly affected differentially by the treatment. Although, SAT 10 was significant in all the models, reading level is not a strong predictor of treatment success in this study.

Table 6
Tests of Between-Subjects Effects (Dependent Variable Posttest 3).

Source	*SS*	*df*	*MS*	*F*
Group	3.32	1	3.32	5.95*
SAT10	5.16	1	5.16	9.26**
Pretest 1	5.54	1	5.54	9.94**
Group X SAT10	2.33	1	2.33	4.17*
Error	26.77	48	.56	
Corrected total	62.79	52		
$R^2 = .57$				

Note. $^{**}p < .01$. $^{*}p < .05$.

Table 7
Parameter Estimates for Posttest 3.

Parameter	β	Std. Error	*t*	95% CI
Intercept	3.74	.84	4.44**	[2.04, 5.43]
Group	2.98	1.22	2.44*	[.52, 5.43]
SAT10	.19	.05	3.77**	[.09, .30]
Pretest 1	.31	.10	3.15**	[.11, .50]
Group X SAT10	-.14	.07	-2.04*	[-.29, .00]

Note. **$p < .01$. *$p < .05$.

CHAPTER 5

DISCUSSION

The purpose of this study was to investigate the effects of an imagery strategy on student vocabulary learning. My goal was to add to the available literature on the use of mental imagery as a vocabulary and reading strategy, as well as add support for the integration of arts into content area classes. The results of my experiment demonstrated that the use of the imagery strategy affects student vocabulary learning in the long term. Thus, the imagery strategy presented in this study results in better vocabulary learning and retention than conventional vocabulary instruction for students of all achievement levels. This is an important finding because prior research on strategies included in the *ARTS FIRST Essential Arts Toolkit* did not conclusively show the strategies to have an effect on reading.

Connections to Theory

My experiment supports the dual coding theories described by Paivio (1971) and Mayer (2001). While the debate surrounding dual coding is ongoing, my study confirms the dual channel approach because the students who participated in the imagery strategy instruction outperformed the students who did not use imagery. This suggests that learning a vocabulary word along with a self-created image results in better learning and retention than learning a vocabulary word without an image, thus supporting the dual coding theory.

My experiment's findings are consistent with prior research on using imagery to teach vocabulary. Smith et al. (1987) and Cohen and Johnson (2010, 2011) found that students who created images as part of vocabulary instruction had better recall and

retention than students who did not utilize images. The authors of these studies suggested that images provided an extra cue for recall and helped students deeply code words. My experiment adds to their findings; however, unlike Smith et al. and Cohen and Johnson, my study used an experimental design, adding validity to the findings. In addition, our studies researched different populations, which suggests that imagery is useful for most students learning vocabulary, from second grade (Cohen & Johnson, 2010) to fifth (Cohen & Johnson, 2011) and sixth (Baldwin, current study) grades, to university students (Smith et al., 1987). Finally, the form of the imagery strategy instruction was different. Smith et al. and Cohen and Johnson used visual art for image creation and presentation; my study used performing art, or drama, for image creation and presentation. Similar outcomes suggest that the form of the image may be less important than the act of creating an image.

Dufflemeyer (1980) also used performing arts for image creation to support vocabulary learning. Dufflemeyer found that the students who used drama performed significantly better on vocabulary and reading comprehension tests than students who used a traditional vocabulary learning approach. Along with using drama, Dufflemeyer's participants connected the vocabulary to prior experiences. My study used a similar strategy of drama plus prior experiences, and the findings were consistent with Dufflemeyer's results. My study adds to Dufflemeyer's findings, as my participants were in middle school, and his were university students. We can conclude through the two studies that using personal experiences and movement in drama to deeply process vocabulary results in better learning, and can be applied to students as young as sixth grade and as old as university level. All the findings presented here suggest that image

creation, through both visual and performing arts, is effective in the learning and retention of new vocabulary for students from grades two through university.

One of the main reasons for the better performance by the imagery strategy group is the deep processing (Craik & Lockhart, 1972) required when applying this imagery strategy. The steps in the strategy (i.e., reading the definition, presenting a physical image of the word, discussing the images presented by classmates, and creating more representations after discussion) help students to deeply process. Compared to the deep processing involved in using the imagery strategy, the typical vocabulary learning experience of looking up a definition, writing it down, and possibly using the word in a sentence, leads to less effective shallow processing.

When viewed through the lens of the multiple definitions of word knowledge, the two instructional approaches are vastly different and encourage different levels of processing. Students using the imagery strategy are provided with the part of speech and definition, asked to apply the word in a situation, and to discuss how others are using it in a situation. This methodology applies Cronbach's (1942) generalization, application, and breadth, and supports eventual precision and availability in word knowledge. The strategy also places student word knowledge closer to one end of Beck et al.'s (1987) continuum as students discuss multiple uses of a word based on how others are applying the word in multiple contexts. The technique also supports Perfetti's (2007) Lexical Quality Hypothesis by encouraging student development of a mental model of the word. This technique supports deep processing of words under most situations.

Students participating in the normal vocabulary instruction in this study used a dictionary to define a word, wrote the word in a sentence related to our class novel, *The*

Cay, and participated in a classroom discussion about the sentences. This approach incorporated Cronbach's (1942) generalization and application, placed student word knowledge closer to the middle of Beck et al.'s (1987) continuum, with students discussing word usage in a sentence where the context was similar among students. Students were limited in their development of Perfetti's (2007) mental model as the words were discussed in a specific context. While the overall instructional approach facilitates shallow processing, it is possible that students may have deeply processed some words into their mental model of the class novel. However, this was not evident in the results as this group's vocabulary retention was inferior to the imagery strategy group.

This study's results can also be viewed through a sociocultural lens that can help explain why the use of the imagery strategy resulted in better learning than the use of the normal vocabulary instruction. The imagery strategy instruction incorporates Vygotsky's (1978) view that social learning and interaction occur before learning moves to the psychological plane within an individual. The components of the imagery strategy require that students and teacher are all active participants in the learning (Rogoff, 1995), which is a vehicle for deep processing. In the drama activity, students spent most of their time interacting with others, while the normal vocabulary instruction was focused around individual work, which encouraged shallow processing. Although, in the normal vocabulary instruction class, there was some discussion about multiple definitions and the use of the words in sentences, the majority of the class time was spent on individual work. Normal vocabulary instruction could potentially incorporate social learning, but its inclusion is not built into the instructional approach as it is with the imagery strategy.

Connections to Practice

While the No Child Left Behind Act is still in the reauthorization process, it is doubtful reading and mathematics instruction policy will change much. This lack of change is even clearer when looked at in light of the Common Core State Standards (CCSS), which is the latest movement in trying to articulate what students across the country should be learning; 45 states and three territories have adopted the standards that only address English Language Arts and Mathematics (Common Core State Standards Initiative, 2012). The Frequently Asked Questions section of the CCSS website states that English Language Arts and Mathematics are the only standards that will be developed by CCSS because they are the most commonly assessed for accountability; however, the CCSS site does say that other groups are developing and revising standards in other subject areas, including the arts (Common Core State Standards Initiative, 2012). If the testing trend remains the same, the arts will still remain as a neglected instructional area in schools. Teachers who feel strongly that the arts are important for students to experience must find common ground to address the content in the English Language Arts and Mathematics through the arts.

In addition to the competency standards that directly address the English Language Arts, CCSS includes a focus on literacy in Social Studies, Science, and Technical Subjects in the middle and high school grades (in the elementary grades, these standards are incorporated into the reading standards); vocabulary is mentioned specifically in the "Craft and Structure" standards as it relates to vocabulary exclusively for content areas (Common Core State Standards Initiative, 2012). The imagery strategy

presented in this study provides a best practices approach for teachers to address vocabulary through English Language Arts content incorporating performing arts. This strategy could also be used in other content areas because vocabulary is such an essential part of reading in all subjects. This imagery strategy demonstrates several of the qualities recommended for effective vocabulary instruction, including directly teaching vocabulary through rich contexts and multiple methods (National Institute of Child Health and Human Development, 2000). This imagery strategy also employs several of the recommendations by experts in the field when teaching individual words, including providing a definition and context, and activating prior knowledge (Beck & McKeown, 1991; Beck et al., 2002; Stahl & Fairbanks, 1986). While these qualities and recommendations are not specific to teaching vocabulary in an English Language Arts context, and in using the imagery strategy described in this study, the recommendations can be used to support vocabulary learning in all content areas, regardless of a teacher's familiarity with teaching performing arts.

Given the effectiveness of this imagery strategy, it makes sense to require all teachers who use the *Essential Arts Toolkit* to be trained in Snapshot in addition to any other unstudied strategies they might be interested in. Although most teachers are not trained arts teachers, as demonstrated by the Hawai'i Arts Alliance's (1998) survey, the professional development workshops associated with the *Essential Arts Toolkit* offer a feasible option for training teachers to integrate the arts into content areas. Although the professional development workshops are generally four days long, followed by a portfolio sharing a few months later, the benefits to students, as well as the professional development credits offered to the teachers, make the time commitment worthwhile. The

workshops receive support nationally through The Kennedy Center and locally through the Hawai‘i Department of Education, which demonstrates the value these organizations put on training teachers to integrate arts into their teaching.

The Hawai‘i Arts Alliance could also utilize the results of my study to add literature to the *Essential Arts Toolkit*. As a teacher, I appreciate reading theory and studies about why particular approaches work with students. Currently, the *Essential Arts Toolkit* is lacking in that area. While the *Toolkit* does describe Root-Bernstein's (2001) thinking tools as a way to organize the professional development, there is no other literature cited as theory or prior studies to support the use of arts in the classroom. The inclusion of this information would help teachers understand where strategies in the *Toolkit* fit into the larger picture of educational research and practice.

I hope that future studies add to the growing body of literature that supports the integration of arts into other content areas. With more evidence that the arts can tangibly enhance learning, hopefully there will be policy changes that require class time to be dedicated to the arts. While the current approach of targeting teachers interested in integrating arts into their classes is a positive start, it only helps the students of teachers who already believe in arts-integrated instruction. If educational policy were to demand that a certain amount of instructional time be dedicated to the arts, through integration or arts-only classes, more students would definitely benefit from arts training.

Limitations

The main limitation to this study is my dual role as teacher-researcher. Although I believe valid research can be accomplished by teachers in their own classrooms, it is still a limitation that must be recognized. According to Gay, Mills, and Airasian (2006), the

external validity of a study can be threatened by "experimenter effects" (p. 245). These effects can be "passive," meaning they are related to the experimenter's personality, or "active," (p. 245), depending on the nature of the particular influences. In my case, any experimenter bias was likely an active effect resulting from my expectation that the students would learn vocabulary better through the dual coding imagery strategy. In fact, research shows that performance on imagery tasks is influenced by the expectations of the researcher (Intons-Peterson, 1983). While I do not believe my expectations influenced my teaching, it is a possibility that I cannot ignore.

Gay et al. (2006) state that experimenter bias is hard to recognize so it is important to be mindful of its possible effect on external validity. I was aware of this possible bias; I did record each class session, and based on listening to those recordings, I can say that I felt that I taught both classes equally well. However, the nature of the imagery strategy required me to be more upbeat and involved with the whole class at the same time than the typical vocabulary work that took place in the other class. The assessment procedures I followed left little room for experimenter effects because I read the same instructions to each group. If there was any threat to the external validity of my study, it was likely through the instruction in the interventions. To confirm the findings, a similar study should be conducted where the teacher is not the researcher, and, if possible, has no expectations that one strategy will be more effective than the other.

It is also important to mention, however, that while my dual role as teacher-researcher can be seen as a limitation, it could also be considered a strength. I had insight into the study participants that an external researcher could not have. I was aware of other factors that might have influenced the results, such as the level of words used in the

assessments and the social dynamics that might affect the intervention. In this research study, the teacher-researcher role has both positive and negative implications.

Another possible limitation is the size of the study. While there were significant findings in favor of the imagery strategy instruction in this study, there was an interaction that I could not statistically explain between instructional group and reading level (as indicated by the SAT10 covariate). In the follow-up analyses that I conducted to try to explain the interaction, only 27 students were included. They were the students in the original imagery strategy instruction group. While the interaction suggests that there is a relationship between reading level and success of the instructional treatment, I could not find the relationship in this small group. However, the possible relationship does warrant further study with a larger group because the interaction indicates that there is a relationship between reading level and type of instruction.

Future Directions

Although the prior studies on strategies used in the *Essential Arts Toolkit* had mixed results (Brandon et al., 2007; Brandon et al., 2011), my study provides conclusive evidence that one of the strategies, Snapshot, is effective in teaching vocabulary. Future studies could look at other *Toolkit* strategies and possibly identify which strategies would work best with which kinds of content. For example, while Snapshot works well with vocabulary learning, perhaps another strategy will work better for learning mathematical concepts.

I would like to conduct this study again with a few changes. First, I would choose a more difficult vocabulary measure. Many of the words on this test were already somewhat known by the students. If I were to do it over again, I would choose a test

meant for one grade level higher. This would then truly be a test of words most students would not already know. In addition, the study could be even more powerful if it were replicated with more teachers and students in multiple grade levels as it would add variance to the groups.

APPENDIX A
Quality of Arts and Literacy Program Implementation Rating Form

Teacher: _____ Rater: _____ Date: _____

Type of observation (*check one*): □ Live classroom observation □ Review of videotape Video code or title:_____

Criterion	Rating						Notes
	High		**Medium**		**Low**	**N.O.***	
1. The teacher communicates to the students the connection between the strategy and the lesson objectives.	5	4	3	2	1	0	
2. The teacher communicates to students clear instructions of what they are expected to do. (where and how to begin and end in the strategy and what is required of them during each step, a review of the strategy, key components of the strategy).	5	4	3	2	1	0	
3. The teacher prompts students to explore creatively (e.g., "Consider another level."; "Use another part of your body."; "Do it slower and bigger next time."; "Do something you haven't done before.").	5	4	3	2	1	0	
4. The teacher prompts students to describe what they observe other students doing (e.g., "What kinds of shapes do you see?"; "What do you notice about the movement?").	5	4	3	2	1	0	
5. The teacher prompts students to interpret what they think is being expressed (e.g., "How do you think the character is feeling now?"; "How is his or her body or expression communicating this?").	5	4	3	2	1	0	
6. The teacher prompts students to articulate their understanding of the lesson objective (e.g., "What words can you use to describe the character's feelings?"; "What do you think will happen next?" "Why?").	5	4	3	2	1	0	

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