Assessment and Instruction for Developing Second Graders' Skill in Ascertaining Word Meanings From Context

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Educational Studies)
in the University of Michigan
2019

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Dedication

Dedicated to my brother, Michael, one my earliest inspirations for using language to love, laugh, and learn.

Acknowledgements

I am grateful to so many people who have shared their expertise, time, love, support, encouragement, smiles, enthusiasm, wisdom, and so much more to support me in completing this dissertation.

I would like to thank my dissertation committee. It has been such a rewarding experience to learn from each of you. Your expertise and insights have helped me to learn so much about scholarship. To my advisor and co-chair of my dissertation committee, Dr. Nell K. Duke, I will always remember that you called me on Super Bowl Sunday to congratulate me on being admitted to the Educational Studies program. I do not remember who won the Super Bowl that year because I will always remember feeling like the winner that Sunday. Working with you has felt like being on a winning streak, with every teaching, research, professional development opportunity and so many other projects. I have learned so much from not only your brilliance, but also your commitment to education and your generosity. To my mentor and co-chair of my dissertation committee, Dr. Gina N. Cervetti, thank you for generously sharing your wisdom with me. When my imagination threatens my productivity you have been there to ground my steps. I aspire to be as brilliant and thoughtful a researcher as you are. I must also thank the composite that is Nell and Gina. Some of my most memorable academic moments have happened with the two of you. I co-authored my first two publications with you. It was truly a delight listening and learning from both of you as you supported me in completing this dissertation and degree. Thank you for seeing and supporting my passion for teaching young children. It is apparent that I could not have accomplished so much in the time I had here without

you two. To Dr. Frederick J. Morrison, thank you for providing an additional perspective to my work. I was so grateful when you agreed to serve on my committee. Your questions pushed me to think more deeply about additional developmental aspects of word learning. To Dr. Tanya S. Wright, it was such a privilege to have you on my committee. Your insights, feedback, and questions furthered my knowledge of vocabulary research. Tanya, you may not remember, but I have kept in mind the nudge you gave me to do an intervention study for my dissertation one random day in Sweetwaters—thank you. This dissertation and degree was quite the endeavor and words can never express how much I appreciate the support of this rock star committee.

Thank you to the administrators, teachers, and students who participated in these studies. I appreciate you welcoming me into your schools and classrooms. I could not have done this work without you.

I must express gratitude for the professors, staff, and friends who have supported me before and during my time at the University of Michigan. Thank you to Drs. Pamela Mason, Paola Uccelli, and Jenny Thomson for your support in beginning my journey to a doctoral degree. Thank you to the other members of the Literacy, Language, and Culture unit, Dr. Annemarie S. Palincsar, Dr. Mary J. Schleppegrell, and Dr. Enid Rosario-Ramos for helping further my knowledge of literacy development and research and for playing key roles in supporting me in meeting program milestones. Thank you to Dr. David K. Cohen for extending the conversation beyond the classroom. Thank you, Dr. Matthew Ronfeldt, Dr. Pamela Moss, and Dr. Michelle Bellino for creating welcoming and intellectually stimulating learning environments. Thank you to Dr. Matthew Diemer for a wonderful learning experience in your psychometrics course and for serving on my pre-lim committee. Thank you to Dr. Simona Goldin, Dr. Debi Khasnabis, Dr. Maisie Gholson, Dr. Henry Meares, and Dr. Carla O'Connor,

you have inspired me in various ways to remain committed to educational research. To Dr. Deborah Ball, thank you for your leadership and kindness. I will always be grateful for how you fostered a sense of community in the SOE.

I love research and I have had wonderful opportunities to work on research projects that cover a wide-range of topics and methodologies. Thank you to Dr. Holly Craig, Stephanie Hensel, Dr. Camille Wilson, Dr. Bridget Maher, Dr. Brian Rowan, and Dr. Chandra Alston for the opportunity to work on each of your research projects.

It is always a delight to meet people who can instantly brighten your day. Thank you to Joanna Elliot for your warm spirit, kindness, and consistent willingness to share your expertise. Thank you to Dr. Emma Flores for providing a dependable and loving community beyond the SOE through the Rackham Merit Fellowship program.

I often reflect on how lucky I was to enter the Educational Studies program in 2014. Annie Reinish, Kimberly Ransom, Eleanor Martin, Whitney Hegseth, Katie Revelle, Dr. Carolyn Giroux, Jenny Sawada, Umut Gursel, Kolby Gadd, Lauren Hickman, Dr. Sabrina Bobsin Salazar, Andrea Cisneros, Dr. Hillary Greene Nolan, Ryan Hughes, Rachel Kuck, and Alexandra Sherman, you all have been the most amazing cohort mates. I love how we have learned and laughed together. Thank you to my academic sisters, Dr. Hye Jin Hwang, Dr. Shana Rochester, Katie Revelle, Maggie Hanna, and Julia Lindsey, may we always support and learn from one another. Hye Jin and Shana, thank you both for providing bright guiding lights. Thank you to Carolyn, Katie, and Jenny, my fellow lovely ladies of literacy, for your friendship. I am grateful for how we have supported each other through some pretty intense challenges and celebrated one another.

To Dr. Natalie Davis, Dr. Alaina Neal Jackson, Dr. Tabitha Bentley, Dr. Shanyce Campbell, Dr. Rebecca Gadd, Christina Morton, Gordon Palmer, Kamaria Porter, Asya Harrison, Channing Mathews, Naomi Wilson, Dana Nickson, Laura Ann Jacobs, Ashley Jackson, Carolyn Hetrick, Paulina Fraser, Naivedya Parakkal, Amber Sizemore, A.C. Coleman, Darrell Allen, Nicolas Boileau, Charles Wilkes, and Gloria Toriche it has been such a pleasure learning beside each of you. Each of you in your own way has been an inspiration to me, thank you.

I am forever grateful for Dr. Aixa Marchand, Ebony Perouse-Harvey, Kimberly Ransom and Amber Willis. Our beautiful friendship has consistently sustained me through this program. I will always cherish how generously you have shared your strength, compassion, humor, and wisdom to support me through this process. Your support and love are truly gifts from God.

Thank you to the Department of African American Studies for helping me to further my passion for providing quality education to black children. I am grateful to Dr. Magdalena Zaborowska. Taking the James Baldwin course with you while collecting data was a constant reminder of why I study education. Thank you to James Baldwin for your wisdom. Yes, I too believe that a purpose of education is “to create in a person the ability to look at the world for him[her]self.” It is my life’s mission to help children do this and to witness their worlds change as a result. I am also grateful to Dr. Lydia Kelow-Bennett. Working with you to learn more about black cultural studies has positively impacted my research and personal life. Thank you for your generosity. It was an absolute gift during this dissertation process. I am also grateful for how you have opened up new perspectives to me to further my research on the life, legacy, and lyrics of Prince Rogers Nelson.

I must also extend gratitude to one of my earliest inspirations to pursue excellence in all things. I do not remember when I first learned about Prince. My entire life he has been a central

source of inspiration. Now, studying his lyrics and his childhood has furthered my theories and perspectives on providing educational opportunities to black children in black communities.

I would also like to thank my family. Growing up in a house with four sisters and a brother there was rarely a quiet moment. Jokes, singing, storytelling, reading, debating, rule-making, whispers at bedtime filled my childhood home and fueled my love of language. Thank you Candice, Erika, Kelly, Tracy, and Michael. Thank you, Mom and Dad for encouraging me to imagine and believing that I could be and do all things that I imagined. Thank you, Grandma for your constant prayers and for teaching me to live my beliefs. Thank you to my niece, Eriel for bringing sunshine on your visits to Ann Arbor. Thank you to my nephew, Zachery, your confidence is inspiring. Thank you to my nieces Michaela and Mariyah, for allowing me to pick your brilliant brains to develop aspects of the vocabulary assessments and intervention I developed for this dissertation. Thank you to my nephews, Jermaine Jr. and Michael Gregory, whose births brought joy to my life during this Ph.D. program. Thank you to my bestie-sisters, Denea and Miesha for consistently encouraging me with texts, gifs, and updates on life outside of research. I love you all.

Finally, I need to express my deepest gratitude to my best friend and husband, Richard B. Leverett. Richard, you have been my greatest supporter. You have believed in me and been there when no one else has been or knew to be. I also want to thank you for your strength and allowing me to leaning on it, even when your world was cracking. We lost your dad during my time in this program. Mr. Leverett, thank you for believing in me and loving me. Richard, the memory of your mother has also been a support. Mrs. Leverett, thank you for loving me and being an example of selfless love and strength. Brittany and Briana, I also thank you for your

thoughtfulness and loving messages throughout this process. Richard, thank you for all your sacrifices. In the words of Prince, “love is too weak to define just what you mean to me.”

Ultimate praise and gratitude goes to the Most High.

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Abstract

The vocabulary knowledge of early elementary children is of particular importance because it is predictive of later comprehension skills and academic achievement. Supporting children's development of skill in using word-learning strategies to ascertain word meanings from context may be a significant way to build their vocabulary knowledge given that most vocabulary is learned incidentally from oral and written contexts. Such support may also help children meet reading and language standards that require them to determine the meanings of unfamiliar words from grade-level texts. However, there is minimal research on how to support young children's development of this skill. Therefore, there is a need for research on effective instruction in developing this skill and for research on the development of assessments that allow us to better understand the development of this skill.

This dissertation consists of two studies written as separate manuscripts. Both manuscripts are focused on young children's skill in ascertaining unfamiliar word meanings from context as a means to support vocabulary knowledge and reading skills. The first manuscript reports on the development and psychometric testing of the Noticing Unfamiliar Words Assessment (NUWA), an assessment of young children's skill in noticing unfamiliar words within informational context. This assessment was created to measure noticing unfamiliar words as an underlying skill involved in the process of ascertaining the meaning of unfamiliar words from context. At this time, it is unclear whether skill in noticing unfamiliar words is important to young children's vocabulary development. Therefore, an assessment that measures this skill in young learners is needed to better understand whether and how noticing unfamiliar words is

related to children's vocabulary development and comprehension skills. The assessment underwent expert review, other processes to establish validity, and revisions prior to being administered to 55 second-grade students. After eliminating poorly functioning items, an exploratory factor analysis was conducted. Results indicated that a 15-item version of the assessment had an adequate fit. The mean inter-item correlation of .31 and the Cronbach's alpha reliability of .84 suggest that the assessment has adequate internal consistency reliability.

The second manuscript reports on the efficacy of a 15-lesson vocabulary intervention designed to develop second graders' flexibility and independence in using multiple word-learning strategies. Specifically, the lessons teach second graders to notice unfamiliar words and contextual analysis by using four types of context clues (antonym, definition, picture, and synonym clues) to ascertain the meanings of unfamiliar words within informational texts. The study used a randomized controlled trial design to examine the effects of the intervention. The 78 second-grade students who attended schools within high-poverty communities were randomly assigned to receive the vocabulary intervention or to continue to receive business-as-usual instruction. Results indicate that the intervention had positive effects on developing children's skill in noticing unfamiliar words. However, there was no difference found between the intervention and control group's performance on a measurement of children's skill in ascertaining the meaning of unfamiliar words from context.

This dissertation contributes to early vocabulary research in that the NUWA may be beneficial to researchers as it provides a tool to further investigate the role of skill in noticing unfamiliar words in children's vocabulary development. Additionally, educators may find the NUWA and the intervention beneficial for implementing vocabulary instruction that builds children's capacity in using word-learning strategies during listening and reading activities.

Introduction

Instruction in word-learning strategies has been found to have positive effects on students' vocabulary knowledge (e.g., Fukkink & de Glopper, 1998; Hairrell, Rupley, and Simmons, 2011). However, most research on this matter has been conducted with students in Grade 3 or higher. Skill in applying word-learning strategies may be of particular importance to young children's vocabulary development because most words are learned incidentally through oral and written contexts (Sternberg, 1987). Therefore, children who are adept at using context to infer word meanings are more likely to be able to build the vocabulary knowledge needed to comprehend texts than children who do not perform this skill well. There is evidence that the more vocabulary knowledge a child has, the more likely they are to be able to comprehend texts which facilitates their ability to engage with more texts, providing more opportunities to build more vocabulary knowledge (Stanovich, 1986). Given this reciprocity between vocabulary and comprehension, it seems helping children to develop skill in inferring word meanings as early as possible is a promising instructional pursuit.

Research indicates that skill in inferring word meanings varies among individuals. Factors such as existing vocabulary knowledge, working memory, word reading skills, and reading comprehension skills influence skill in inferring word meanings from context (e.g., Cain, Oakhill, & Bryant, 2004; Geva, Galili, Katzir, & Shany, 2017; McKeown, 1985; Shefelbine, 1990). Individuals who show higher skill in these areas tend to be more capable of inferring word meanings. Children from low socio-economic-status (SES) backgrounds may especially benefit from instruction in word-learning strategies given they on average they enter school with

relatively less academic vocabulary knowledge when compared to children from more affluent backgrounds (e.g., Fuller, Eggers-Piérola, Holloway & Rambaud, 1996; Hoff, 2006). Word-inferencing strategy instruction may be a way to help children gain skill and independence in inferring academic word meanings during listening and reading in the early grades. Such instruction has the potential to accelerate their vocabulary development improving their chances of developing the reading skills needed to experience academic success (Neuman, 2011).

To date, most of the research on vocabulary instruction for children in the early elementary grade levels has focused on directly teaching word meanings (e.g., Beck & McKeown, 2007). However, given that it is estimated that by second grade, children who experience slower vocabulary development know approximately 4,100 fewer root word meanings than children who have what is considered a large vocabulary (Biemiller & Slonim, 2001), directly teaching individual word meanings may not be an efficient method of eliminating this gap. Indeed, scholars have advocated for a comprehensive approach to vocabulary instruction that includes directly teaching word meanings, as well as "providing rich and varied language experiences, teaching word-learning strategies, and fostering word consciousness" (Graves, 2006, p.5). It is these latter aspects of vocabulary instruction that have been the subject of little research with children in the primary grades. In one of the few studies of the effect of contextual analysis strategy instruction with young children, Nash and Snowling (2006) demonstrated that 12 lessons in contextual analysis instruction for seven- and eight-year-old children from working class backgrounds was effective for improving young children's vocabulary knowledge. Findings also indicated that teaching children to apply contextual analysis strategies was effective for helping them to answer comprehension questions that relied on knowledge of previously taught vocabulary. Based on Wright and Cervetti's (2017) recent

systematic review of vocabulary studies, it is not likely that teaching children one word-learning strategy will impact their general comprehension. The researchers suggested that employing metacognitive strategies and flexible use of multiple word-learning strategies is more likely than single word-learning strategy instruction to influence general comprehension skills. Therefore, in addition to more studies that examine the effect of teaching young children individual word-learning strategies, research on the efficacy of teaching young children multiple word-learning strategies is needed.

Overview of the Dissertation

The purpose of this dissertation was to investigate how young children's vocabulary development may be improved through instruction in how to apply word-learning strategies, given the dearth of research in this area and that reading and language standards expect primary-grade children to demonstrate skill in determining word meanings from context (NGA & CCSCO, 2010). I developed and tested an assessment that measures second-grade students' skill in noticing unfamiliar words, which I conceptualize as a skill that enables learners' skill in inferring word meanings from context. This assessment was also used as a measure in my second study, which evaluated the efficacy of a vocabulary intervention that I designed to teach second-grade students metacognitive strategies and contextual analysis strategies to infer word meanings from context. With adult learners, skill in noticing unfamiliar words has been found to be related to inferring word meanings as it gives learners more opportunities to infer word meanings (e.g., Van Zeeland, 2014). Therefore, in this study young children were taught to notice unfamiliar words and to rate their familiarity of words as first steps in inferring word meanings from context. Students were also taught to use four different types of context clues to ascertain the meaning of unfamiliar words from context. Findings from these studies inform the efficacy of

teaching young children to flexibly use metacognitive strategies to infer word meanings from context.

The findings from these two studies are reported in an alternative-format dissertation that includes two journal-length manuscripts prepared in a manner that meets the guidelines of the journals to which they will be submitted for review. The alternative format is a fitting format for these dissertation studies because it will expedite the process of disseminating the findings to its intended audience, educational researchers, for research purposes and practical application (Duke & Beck, 1999). The manuscripts have been written as research articles that include an abstract, rationale, review of relevant previous research, research methods, analytical procedures, results, and a discussion of the findings, implications, limitations, and the significance of the study.

In the first study, I report how I developed and tested an assessment of young children's skill in noticing unfamiliar words within context. Twenty-six assessment items were constructed to consist of three-sentence informational passages about a topic young children would likely study in school. Twenty of the items featured pseudo-words as target words that children were expected to identify as unfamiliar. The remaining six items did not feature a pseudo-word and were included in order to provide a more naturalistic listening context in which some passages may not contain words that are unfamiliar. Based on feedback from literacy experts and pilot testing with students, revisions were made to assessment items. Primary-grade teachers then rated the assessment items as another judge of the level of difficulty second-grade students may have in comprehending the passages.

The study's sample included 55 second-grade students from two school districts in the Midwestern United States. The students from these districts were recruited to include a racially and socio-economically diverse representative sample. The types of student responses were

coded and analyzed to determine children's skill in identifying the unfamiliar pseudo-word. Items for which student responses indicated difficulty in responding as expected were eliminated. Descriptive statistics and correlations were also computed to analyze the variance in student responses and the internal consistency reliability of the assessment. The mean-item correlation of .31 and a Cronbach's alpha of .84 indicated adequate internal consistency reliability. An exploratory factor analysis was also conducted to test the hypothesized unidimensional factor structure of the assessment. The analysis verified this hypothesis as the model fit indices suggested a 15-item version of the assessment had an adequate fit.

In the second study, I examined the effects of a vocabulary intervention on second-grade students' skill in ascertaining word meanings from context. The study addressed the following research questions: 1) What are the effects of a vocabulary intervention that teaches metacognitive word-learning strategies on second graders' skill in noticing unfamiliar words? 2) What are the effects of a vocabulary intervention that teaches metacognitive word-learning strategies on second graders' skill in ascertaining word meanings from context?

This study included 78 students from two high-poverty school districts in the Midwestern United States. The study's design was a randomized controlled trial in which children were randomly assigned to either participate in the vocabulary intervention or to continue to receive business-as-usual instruction. The vocabulary intervention was taught over a period of six weeks. The intervention included 15 lessons. The introductory lesson taught the importance of words and noticing them. Each of the subsequent lessons employed the gradual release of responsibility model (Duke, Pearson, Strachan, & Billman, 2011; Pearson & Gallagher, 1983) to teach second graders to use metacognitive strategies to notice unfamiliar words and follow a clarifying procedure to infer the meaning of unfamiliar words by using a repertoire of contextual analysis

strategies, which was operationalized as four specific types of context clues (antonym, definition, picture, and synonym clues) to ascertain the meaning of unfamiliar words encountered within informational text. I administered a pretest and posttests to students in the experimental and the control condition in order to examine the effects of the vocabulary intervention.

Regression analyses revealed that the children who participated in the intervention outperformed the students who did not participate in the study in noticing unfamiliar words. There was no statistically significant difference between the groups' performances on the assessment of skill in ascertaining word meanings from context. The study's findings have implications for word-learning strategy instruction in the primary grades.

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Chapter 1: Assessment of Children's Skill in Noticing Unfamiliar Words Within Informational Texts

Abstract

Most word meanings are acquired incidentally from oral and written contexts. Reading and language standards expect primary-grade students to be able to determine the meaning of unfamiliar words from context. However, to be able to make an attempt at inferring the meaning of an unfamiliar word, the word must first be attended to or noticed. Therefore, it is important that we better understand when and how children process unfamiliar words during reading and listening activities. In this study, the Noticing Unfamiliar Words Assessment (NUWA) that measures children's skill in noticing unfamiliar words while listening to passages of text was developed and examined using psychometric analyses. The assessment items feature short informational passages of texts with some items containing pseudo-words as the unfamiliar target word. The assessment items were revised several times after they were reviewed by literacy experts and piloted with students. The revised assessment was administered to 55 second-grade students. Items were eliminated based on qualitative and quantitative analyses. An exploratory factor analysis (EFA) was conducted on the remaining items to test the hypothesized unidimensional structure of the assessment. The results of the EFA indicated that the assessment had an adequate fit. Additionally, the assessment has adequate internal consistency reliability. These findings suggest that the NUWA may be helpful in classroom and research applications aimed at better understanding how children engage in inferring word meanings from context.

Assessment of Children's Skill in Noticing Unfamiliar Words Within Informational Context

The size of children's early vocabulary is predictive of their later comprehension skills (e.g., Lee, 2011). Young children's vocabulary is primarily developed incidentally through supportive contexts such as oral communication and shared reading (e.g., Elley, 1989; Oetting, Rice, & Swank, 1995; Weizman & Snow, 2001). As children become more proficient in their reading skills, it is believed that most academic words are learned incidentally as they engage in independent reading of texts (e.g., Sternberg, 1987). It is important that children engage in book reading given that books provide exposure to vocabulary that children might not encounter otherwise. As children encounter new words in such contexts, they have the opportunity to engage in lexical inferencing, that is, to make inferences about the meaning of these words. Researchers note that lexical inferencing is a complex cognitive process and that skill in this process enables text comprehension and opportunities to learn new words meanings, which in turn helps to further the development of a learner's general vocabulary (Wesche & Paribhakht, 2009). Research indicates that skill in lexical inferencing is influenced by existing vocabulary knowledge (e.g., Shefelbine, 1990) and by other reading-related skills, such as word reading skills, working memory, strategy use, and reading comprehension skills (Cain, Oakhill, & Bryant, 2004; Geva, Galili, Katzir, & Shany, 2017; McKeown, 1985). Although these studies have helped us better understand how lexical inferencing skills vary among children, less is known about children's skill in noticing unfamiliar words, which is arguably the first step in the process of lexical inferencing.

Graves (2006) describes word consciousness as "an awareness of and interest in words and their meanings" (p. 7). Scott and Nagy (2004) have noted that promoting word

consciousness includes encouraging children to pay attention to words. Attending to or noticing words is a skill that vocabulary researchers have theorized as an important aspect of vocabulary learning (e.g., Beck, McKeown, & Kucan, 2013; Stahl & Nagy, 2006). A disposition to attend to or notice words provides opportunities for children to engage in the metalinguistic process of judging whether a word is unfamiliar (Merriman, Lipko, & Evey, 2008), which may be an important first step in word learning as it may prompt children to figure out the word's meaning (e.g., Markman, 1979). There are no valid and reliable assessments that measure young children's skill in noticing unfamiliar words within context. Such an assessment would be helpful for classroom and research purposes to better understand how this skill develops in young children, how it influences children's skill in using word-learning strategies, and more broadly how it influences vocabulary development and comprehension skills. Furthermore, studies show that children who demonstrate limited vocabulary early on may experience reading difficulties that endure throughout their schooling (e.g., Cunningham & Stanovich, 1997; Hemphill & Tivnan, 2008; Sparks, Patton, & Murdoch, 2014). With an assessment of children's skill in noticing unfamiliar words we would have another way to detect a factor that may be contributing to limited vocabulary knowledge. This early detection may be key given that more opportunities to learn words from context aids comprehension of vocabulary within texts as well as overall comprehension of the text. Additionally, the assessment would provide a measure of the effectiveness of instruction aimed at developing this skill. Therefore, the purpose of this study was to develop such an assessment that demonstrates adequate validity and reliability to measure children's skill in noticing unfamiliar words within context. In the following sections, I discuss the literature relevant to the development of the assessment, the development of the

materials and procedures, and finally the analyses of the validity and reliability of the assessment.

Literature Review

The Potential Importance of Noticing Unfamiliar Words

Given that early vocabulary knowledge is highly predictive of later comprehension skills (e.g., Cunningham & Stanovich, 1997; Nation & Snowling, 2004) it is important that we better understand the factors that contribute to vocabulary development and growth. Skill in noticing unfamiliar words within context may be an important contributor to children's vocabulary development because most word meanings are learned incidentally while engaged in oral and written contexts (e.g., Elley, 1989; Penno, Wilkinson, & Moore, 2002; Sternberg, 1987). It is possible that skill in noticing unfamiliar words may increase effectiveness in incidental word learning because it provides more opportunities to strategically learn words while reading and listening to texts.

Research on young children's skill in noticing unfamiliar words is needed so that we may better understand whether and how skill in noticing unfamiliar words relates to young children's vocabulary growth. This is an area is of particular interest and worthy of study with second graders, as research suggests some children are experiencing a boost in vocabulary knowledge at this stage, which may contribute to the gap between those with limited vocabulary knowledge and those with higher levels of vocabulary knowledge. These are two findings found in Biemiller and Slonim's (2001) study on the rate of vocabulary acquisition with children from a range of socioeconomic backgrounds. To elaborate, the researchers found that by the end of second grade, on average children who were considered to have low vocabulary, knew 4,100 fewer root word meanings than children who were considered to have high vocabulary. Of the other elementary

grade levels included in the study (K, 1, 4, and 5), differences in vocabulary knowledge were the largest between children with low vocabulary and those with high vocabulary in second grade. Additionally, Biemiller and Slonim found that in second grade, some children experienced a rapid increase in vocabulary knowledge. Biemiller and Slonim speculated that the rapid increase in second graders' vocabulary knowledge might be due to their increased working memory capacity that may allow them to attend to words without losing focus on the overall context (Case, 1992). While this is a promising hypothesis, it is as yet untested. To be able to test this hypothesis, an assessment of second graders' skill in noticing unfamiliar words is needed. Such an assessment would be beneficial for better understanding whether and how noticing unfamiliar words may impact second graders' vocabulary growth, particularly those who demonstrate limited vocabulary knowledge. Furthermore, developing second graders' skill in noticing unfamiliar words may provide an opportunity to accelerate students' incidental acquisition of vocabulary knowledge. An assessment of second graders' skill in noticing unfamiliar words would help us to understand whether instruction that can improve second graders' skill in noticing unfamiliar words and effective instructional methods for developing this skill.

More research on skill in noticing unfamiliar words is also warranted in light of studies that show that young children's metalinguistic skills play a significant role in their comprehension skills (e.g., Dreher, & Zenge, 1990; Wankoff & Cairns, 2009). Metalinguistic awareness is comprised of several skills including, phonological awareness, ambiguity detection, and word familiarity judgment. There has been extensive research on the critical role that phonological awareness plays in young children's reading skills (Ehri et al., 2001). However, less attention has been given to metalinguistic skills that focus on semantic awareness, such as noticing unfamiliar words. To better support young children's vocabulary growth in particular

those who enter school with relatively limited vocabulary knowledge, it would be worthwhile to further investigate how young children's semantic awareness develops and influences their vocabulary growth. Additionally, research on lexical inferencing with older students provides evidence that second graders' skill in noticing unfamiliar words is worthy of study. Research with adult L2 (second language) learners suggest that noticing unfamiliar words may be an enabling skill of lexical inferencing (e.g., Cai & Lee, 2010). Lexical inferencing is an important skill in learning new words while engaged with texts because it allows the reader to maintain attention on comprehending the text while also learning semantic information about unfamiliar words or additional semantic information about more familiar words.

The following literature review discusses research on metalinguistic awareness with young children and lexical inferencing with older learners to provide justification for the need to study and measure skill in noticing unfamiliar words with second graders. At this time, there is no research with primary-grade students that suggest that skill in noticing unfamiliar words is significant in their vocabulary development or that it is a skill that can be developed at this age. However, an assessment that measures second graders' skill in noticing unfamiliar words is needed to reveal whether and how this skill is related to vocabulary development. In particular, I discuss the following four bodies of literature within metalinguistic awareness research and lexical inferencing research that informed the development of the assessment reported in this paper: research on the factors that influence noticing unfamiliar words, research on the relationship between noticing unfamiliar words and vocabulary growth, research on instruction aimed at developing skill in noticing unfamiliar words, and research on existing measures of skill in noticing unfamiliar words.

Factors Related to Skill in Noticing Unfamiliar Words

Shared book reading and communicating with speakers who provide supportive interactions offer opportunities for children to incrementally learn the meanings of unfamiliar words. In processing language, children segment streams of speech into individual words. The child accesses their lexicon to attach meaning to each of the words to make sense of the stream of speech (Bloom, 2001). However, when unfamiliar words or new uses of words are encountered, the child may notice when they cannot attach meaning to the unfamiliar word or may notice that a word is being using in a way that is inconsistent with their prior knowledge about the word (Hernandez et al., 2004). This identification process may be a first and essential step in learning unfamiliar word meanings.

The literature on how skill in noticing unfamiliar words varies from child-to-child is limited. Research shows there are several genetic and environmental factors that influence language development (e.g., Stromswold, 2006). It is reasonable to expect that similar factors would affect children's skill in noticing unfamiliar words within context. Given there is limited research on this topic with young children, this review of literature reports on studies that have measured a similar skill, ambiguity detection with young children, as well as research on skill in noticing unfamiliar words with adult second language (L2) learners, as these areas of research may inform what might be expected to be factors that affect young children's skill in noticing unfamiliar words.

Metalinguistic awareness refers to "the ability to reflect on language as an object" (Smith & Tager-Flusberg, 1982, p. 449). As children progress in their development of language skills, they become more conscious of their thought processes about language and words. Instruction

can help children to develop these metalinguistic skills (e.g., Kamowski-Shakibai & Cairns, 2016).

As stated earlier, metalinguistic awareness enables the detection of unfamiliar words, which creates opportunities to learn unfamiliar word meanings. Both phonological and semantic retrieval processes are involved when evaluating the familiarity of a word. Merriman, Lipko, and Evey (2008) studied preschoolers' skill in word familiarity judgment, which is a metalinguistic skill. The findings indicated that how children store information about words in their working memory, that is information about the word's form or semantic information, influences how they make word familiarity judgments. In this study, word familiarity judgment was measured by reading children a story that contained familiar and unfamiliar words (word-like pseudo-words). The children were asked to listen for words that they did not know and words that they thought were pretend words. While reading to the child, the test administrator stopped to ask the children, "Do you know what __ is?" The children were asked about 5 familiar words and 5 unfamiliar words. After reading the story, the children were asked to share what they knew about the unfamiliar words. The children's phonological and semantic processing skills were assessed using a measure of their ability to repeat high-word-like pseudo-words and a measure of their ability to recall semantic related word pairs. The results of this study indicated that older children (four year-olds) were able to judge word familiarity more accurately than younger children (3 year-olds). They also found that preschool-age children differ in how they use phonological and semantic processes to judge word familiarity. Higher skill in one area but not the other dictated how the child made judgments about word familiarity. Whereas children with high skill in both phonological working memory and semantic retrieval were able to flexibly make word familiarity judgments. Related to vocabulary development, such findings provide evidence that

children who rely on phonological memory processes only to judge word familiarity may benefit from early instruction that focuses on teaching children word meanings, what it means to "know" what a word means and how to retrieve semantic information about words. Retrieving semantic information about a word's meaning may help children notice the presence of unfamiliar words.

Another manifestation of metalinguistic awareness is lexical ambiguity detection. Kamowski-Shakibai and Cairns, (2016) define this metalinguistic skill as "the ability to determine that some words and sentences have more than one meaning" (p. 443). These researchers investigated whether kindergartners' skill in lexical ambiguity detection could be accelerated through instruction. The researchers tested this hypothesis using an experimental design with 32 English-speaking kindergarten students from middle-class backgrounds assigned to receive ambiguity detection training or vocabulary training. Findings indicated homophone detection required both metalinguistic awareness and regulation in retrieving semantic information from one's lexicon. Furthermore, the ability to determine dual meanings of an ambiguous sentence was influenced by the ability to process the sentence efficiently and flexibly.

Coupled with the findings from Merriman et al.'s (2008) study, we can see that working memory, metacognitive skill, and existing vocabulary knowledge are factors that influence metalinguistic skill of ambiguity detection which is similar to noticing unfamiliar words as both require metacognitive processes that allow for semantic retrieval as well as decisions regarding the semantic knowledge that was accessed. Put another way, ambiguity detection and noticing unfamiliar words may be influenced by the same factors given they both require accessing existing semantic knowledge to judge whether and to what extent a word's meaning is understood in context. Studies with adult L2 learners' skill in noticing unfamiliar words also

demonstrate that working memory and semantic knowledge play a role in the development of this skill.

Cai and Lee (2010) investigated whether adult L2 learners heard unfamiliar target words while listening. Specifically, the researchers recruited 20 Chinese second-year English majors to listen to nine 80-word texts. Each text featured one low-frequency word, about popular science written in English. The nine texts were equally divided based on the type of context clue they represented: 1) sentential clues, 2) clues interspersed across the text, and 3) no explicit clues, but background knowledge on the topic could support meaning inferencing. During individual interviews, participants listened to a text twice and afterwards were asked about noticing the unfamiliar target words, how they figured out the meaning of the unfamiliar target words and the content of the text. Cai and Lee found that across the listeners, the target word was not noticed in 24% of the cases. This finding suggests that such a task might be challenging to even to adults.

Cai and Lee's (2010) study provides insight into some factors that may explain individual differences in noticing unfamiliar words. The rate of failing to notice the unfamiliar word was highest when the clues were in sentential context (33.3%) and lowest when there were no explicit clues, but background knowledge could support meaning inference (18.3%). The rate of no-attention was 21.7% when the clues were interspersed across the text. Here we see that L2 learners pay more attention to unfamiliar words within contexts in which they can rely on their background knowledge or experience to infer the meaning of new words, providing more opportunities to learn new words. This is an important finding regarding listening comprehension. As the authors note, listeners were likely able to use the inferencing strategy more and attend to new words more when the clues were interspersed across the text versus when there was only one clue embedded in a sentence. This is likely the case given more clues

across the text assists with the tax that is placed on working memory during listening comprehension. The multiple clues also helped to keep the learners' attention on the unfamiliar word. In addition, the meaning of the unfamiliar word was also related to the theme when the clues were interspersed across the text. Therefore, overall comprehension of the text provided a clue to the meaning of the unfamiliar word, whereas in the sentential context condition, the immediate context may not have as much bearing on overall comprehension. In the background knowledge context condition, where most attention was given to unfamiliar words and inferencing was used most, the authors purport that working memory is aided in this context more so given that background knowledge is readily available and can be processed in conjunction with new information with relative ease. This study provides evidence that working memory and background knowledge may account for individual differences in skill in noticing unfamiliar words within context.

Van Zeeland (2014) also conducted a study with adult learners that included investigating skill in noticing unfamiliar words and its influence on inferring word meanings. The sample included 47 native and 30 (L2) nonnative speakers of English. L2 learners' skill in noticing unfamiliar words was assessed by having them press the spacebar when they heard an unfamiliar word while listening to an audio recording on a web application. Results indicated that L2 learners noticed the nonwords in 44.2% of the cases, underscoring the difficulty of the task of noticing unfamiliar words while listening. The researcher found that vocabulary knowledge was positively correlated with L2 learners' skill in noticing unfamiliar words while listening. That is, L2 learners with a larger vocabulary size, specifically those who had receptive knowledge of about 5,000 word families or more, identified significantly more nonwords than L2 learners with a smaller vocabulary size. Further analysis of the contribution of vocabulary size to skill in

noticing unfamiliar words within context and overall inferencing indicated that larger vocabulary sizes did not directly affect learners' inferencing skill, but larger vocabulary sizes were positively correlated to skill in noticing unfamiliar words within context, and thus providing more opportunities to make inferences.

Most importantly, these studies indicate that individuals vary in their metalinguistic skills. Studies with L2 adult learners show that individuals vary in their ability to notice unfamiliar words and that young children vary in metalinguistic skills, ambiguity detection and word familiarity judgment, which are skills similar to noticing unfamiliar words. Taken together it is likely that young children also vary in their ability to notice unfamiliar words. An assessment that examines young children's skill in noticing unfamiliar words would help us to better understand whether children vary in this skill and the factors that contribute to this variance.

Instruction in Noticing Unfamiliar Words and Vocabulary Growth

Although the mechanisms by which incidental word learning leads to vocabulary growth are not completely clear, there is evidence to suggest that skill in noticing unfamiliar words may be a contributing factor. In a quasi-experimental study, Fraser (1999) taught eight L2 university students lexical processing strategies that included metacognitive strategy training and focused language instruction for a total of eight hours over five months. Specifically, the students were taught to consult reference sources (e.g., bilingual and English dictionaries) and to use word-inferencing strategies, such as using cognates, morphological analysis, and grammatical function. The study used a repeated measures design to examine the effects of the strategy training instruction. Relevant to this study, the researcher used the words that were identified by the participants as unfamiliar during the weekly think aloud sessions that were conducted in order to

track participants' use of the taught word-learning strategies. The participants' knowledge of 10 of the words that were identified by participants as unfamiliar in the previous week was measured using the Vocabulary Knowledge Scale (VKS, Paribakht & Wesche, 1993; Paribakht & Wesche, 1996), which has a scale of 1 (no familiarity) to 5 (can use the word in a sentence). Overall, Fraser found there was no direct effect of teaching word-learning strategies on vocabulary learning. However, the study suggests there may be an indirect effect. Fraser found that the rate at which students attended to unfamiliar words increased over time and as a result provided more opportunities to infer word meanings.

This study was conducted with adult L2 learners, and therefore may have different implications for young children. For example, adult learners may have greater working memory capacity to focus on unfamiliar vocabulary and maintain a focus on overall comprehension. Additionally, L2 learners may have a heighten awareness of unfamiliar words if they are reading in or listening to their L2. Nevertheless, it would be worthwhile to explore whether instruction in word-learning strategies also helps younger children notice unfamiliar words given they are developing greater working memory capacity and they are encountering more academic words in school. Skill in noticing unfamiliar words may provide young children with more opportunities to acquire meanings of unfamiliar academic words. An assessment of young children's skill in noticing unfamiliar words would help to examine the effects of such instruction.

Lubliner and Smetana's (2005) comparison study with 111 fifth graders from low-performing schools and high-performing is one of the most compelling studies of the role of skill in noticing unfamiliar words in not only vocabulary growth, but reading achievement as well. Lubliner and Smetana evaluated the effectiveness of a program called Comprehensive Vocabulary Development (CVD). This program included instruction in self-monitoring and self-

regulation to help fifth graders monitor their understanding of words and to internalize and apply word-learning strategies (using context, a synonym, morphology, prior knowledge, asking a classmate, teacher, or consulting a dictionary). Seventy-seven fifth graders from a low-performing Title I school participated in the intervention. The researchers examined the program's effectiveness in mitigating the achievement gap by comparing these students' vocabulary and text comprehension to students' vocabulary and text comprehension to 34 fifth graders attending an above-average performing school with considerably lower percentages of students who received free or reduced-price lunch and students who were from ethnic and linguistically diverse backgrounds. The students at the above-average performing school did not receive the intervention. Results of the study indicated that students in the low-performing schools, the intervention group, increased in their ability to notice unfamiliar words from pre-test to post-test. The students in the low-performing schools were administered the Metacognition test (Meta) (a description of the assessment can be found in the Existing Measures of Noticing Unfamiliar Words section). At pretest the students noticed 20% of the unfamiliar words, whereas at posttest they noticed 38% of the unfamiliar words. In addition, the students in the low-performing schools made significant gains in vocabulary as well as in reading comprehension. There was no statistically significant difference between the two groups' performance on the posttests of vocabulary and reading comprehension, whereas there was a substantial difference at pretest. These findings indicate that the CVD was effective in closing the achievement gap in these domains. Lubliner and Smetana (2005) attribute some of the improvement in the students from low-performing schools' vocabulary and comprehension to the fact that their metacognitive skills in noticing unfamiliar words improved. The findings in this study are particularly significant as they demonstrate that skill in noticing unfamiliar words is a promising mechanism

by which children, particularly children who from lower-SES backgrounds can acquire more vocabulary knowledge and improve in reading comprehension.

Word Consciousness Instruction

Studies on word consciousness instruction provides some insight into how to develop children's skill in noticing words unfamiliar words, even though these studies do not examine the effect of word consciousness instruction on children's skill in noticing unfamiliar words. However, these studies do illustrate why it would be beneficial to have a measure of the ability to notice unfamiliar words for use in investigations of the effects of word consciousness instruction with younger children.

Supporting students in noticing unfamiliar words is part of word consciousness instruction. According to Scott and Nagy (2004) word consciousness refers to knowledge and skills that promote an awareness of words and a flexible engagement with the use of words. Studies on word consciousness instruction with older students do suggest that it improves generative knowledge of words and the use of word-learning strategies (e.g., Baumann, Ware, & Edwards, 2009; Scott, Miller, & Flinspach, 2012). These studies focused on fostering word consciousness as a means to develop students' independence in word learning and as a way to promote positive dispositions and awareness of words. For example, Scott, Miller, and Flinspach's (2012) studied VINE (**V**ocabulary **I**nnovations i**n E**ducation), a program that helped develop fourth and fifth-grade teachers' word-consciousness instruction through building teachers' word consciousness and providing support to teachers in implementing word-consciousness instruction. Data for this study was collected over a two-year period within schools in rural, suburban, and urban communities. The sample was diverse in that about 30% of students were English language learners and about 40% of students qualified for free or reduced-

price lunch. Scott and colleagues identified three domains of word-consciousness instruction as a result of collaborating with teachers on the implementation of word-consciousness instruction. The three domains include metacognitive knowledge and awareness, metalinguistic knowledge and awareness, and the affective aspects of word learning. Of particular relevance to this study are the first two domains. Activities in these domains include encouraging students to flexibly use and apply their word knowledge to assess and monitor whether and how to determine that one knows the meaning of a word. Students who participated in the intervention scored statistically significantly better than students in the control group (these students' teacher did not participate in the professional development and support groups) on the VINE vocabulary tests, which included words that were not explicitly taught. This finding held true in both years of the study and thus provides evidence of the positive effect of word-consciousness instruction on upper elementary students' vocabulary development.

In a more recent study, we find evidence that word-consciousness instruction is also beneficial to younger learners. Neugebauer et al. (2017) investigated the relationship between teacher word consciousness talk and student gains in general vocabulary knowledge. The study was conducted with 215 kindergarten students across 27 classrooms in urban schools. To examine teacher word consciousness talk, 20-minute video-recorded lessons of teachers teaching during their daily vocabulary time were coded. An iterative process was employed to develop codes. Three codes emerged: 1) "positively reinforced word use, 2) affirmed students' word recognition, and 3) made connections between words and students' personal experiences" (p. 39). It is important to note that relevant to the present study, examples of affirmed students' word recognition were "wonderful job noticing that new word!" and "oh great work finding that word" (p. 41). These affirmations were given in the context of children finding words that were part of

the curriculum. Kindergarten students' receptive vocabulary knowledge was measured at the beginning and end of the year using the Peabody Picture Vocabulary Test, fourth edition (PPVT-4, Dunn & Dunn, 2007). Results of the multilevel regression analysis indicated that more teacher word consciousness talk was positively and statistically significantly associated with students' vocabulary scores on the PPVT-4.

Together these studies suggest that teachers' word consciousness and their word consciousness talk can influence children's vocabulary growth. However, these studies did not measure the impact of such instruction on learners' skill in noticing unfamiliar words. It would be important to better understand how noticing unfamiliar word is related to word consciousness, which may be a factor in children's vocabulary development as these studies suggest. A valid and reliable measure of young children's ability to notice unfamiliar words would help unearth this relationship. In the following section, I describe methods researchers have used in previous studies to measure this skill with older learners.

Existing Measures of Noticing Unfamiliar Words

Noticing unfamiliar words while listening or reading can be considered part of metalinguistic awareness. Unlike other areas of metalinguistic awareness, such as morphological awareness or phonological awareness, there are no general assessments with demonstrated reliability and validity that measure young children's skill in noticing unfamiliar words. Assessments that measure skill in noticing unfamiliar words do exist. However, they are experimenter-created assessments (assessments developed by the experimenter for purposes of the study at hand) and they were designed for adult participants, not for young children. Therefore, an assessment of this skill that takes into account the developmental stages of young children is needed. Although the authors of these studies (Cai & Lee, 2010; Fraser, 1999;

Lubliner & Smetana, 2005; Van Zeeland, 2014) do not report extensive evaluation of the validity or reliability of these assessments, the evidence of validity and reliability that are reported are worthy of review as they can inform on the affordances and constraints of some methods used to assess skill in noticing unfamiliar words.

Skill in noticing unfamiliar words within context has been measured within both reading contexts and listening comprehension contexts with adult learners. In this section, a brief description of the measures used in four of the studies discussed above to assess skill in noticing unfamiliar words within context is provided, followed by a discussion of their reports of validity and reliability.

In Fraser's (1999) study of strategy training on adult L2 learners' strategy use to infer word meanings from context, she asked students to identify unfamiliar words within 1,000 – 1,200 word passages with high school level readability from the Science & Technology section of *The Economist*. In each individual session, Fraser requested that the participants skim the article to identify unknown words among other tasks during think alouds. Each week, 10 words were selected from those words that all students had identified as unfamiliar. From among these words that were identified by the participants as unknown, 10 of the words were included in a recall task that was used to measure the effect of the training on the adults' word learning skills. Fraser used the think alouds to determine which of the following lexical processes the participants were using while reading the aforementioned assessment materials at various time points over the course of the study: consult, ignore, infer, and no attention. The no-attention category is of interest to the present study because it represents failure to notice unfamiliar words. From the recall task, the author coded for these processes and computed the frequency and percentage of the occurrences.

Cai and Lee (2010) also conducted a study exploring adult L2 learners' use of inferencing strategies and used a think aloud protocol to elicit participant responses. However, in Cai and Lee's study, the participants' skill in noticing unfamiliar words was assessed within the context of listening. The participants listened to nine 80-word texts selected from *New Scientist*. Some high-frequency words from these texts were replaced with low-frequency words. During the development of the assessment, two native speakers of English and two linguists reviewed the texts. Additionally, the assessment was pre-tested.

Similar to Cai and Lee (2010), Van Zeeland (2014) examined adult L2 learners' lexical inferencing within listening contexts. However, Van Zeeland used a web application to play an audio recording of a crime scene investigation teacher discussing his job. The author altered the text to replace 15 of the words with nonwords created by the ARC Nonword Database (Rastle et al., 2002). All other words were deemed likely to be familiar based on a scale used in the Vocabulary Levels Test. These words were among the 2,000 most frequent words in English. The L2 learner pressed the spacebar when they heard one of the nonwords. The assessment was piloted with 19 native English speakers listening to their L1. From the pilot study, the author reported that the nonwords were not difficult to identify as the spacebar was pressed relatively quickly after the nonword was heard and that it was primarily only pressed to signal noticing a nonword.

Lubliner and Smetana's (2005) Metacognitive test (Meta) was developed to measure the students' skill in noticing unfamiliar words within a reading context. This assessment was used as a pretest and posttest in the study described earlier that examined the effects of a comprehensive vocabulary program with fifth-grade students. The Meta featured a 200-word social studies passage with "challenging" words. The children were asked to circle any unknown

words they encountered while reading. After reading the passage the students were assessed using a 20-item multiple-choice test on the words that the researchers considered to be "challenging" words. The researchers measured the fifth graders' ability to notice unfamiliar words by creating a match score that matched the unknown circled words to the words that were answered incorrectly on the multiple-choice test. The researchers noted that although this task was naturalistic, it was likely difficult for children to identify unknown words while reading a challenging text.

Across these four measurements, information related to validity and reliability was reported to varying degrees. For example, with regard to content validity, Cai and Lee (2010) reported that after altering original texts to meet the needs of their assessment, the assessment was reviewed by experts. The other authors of the reviewed assessments did not report that their assessments underwent expert review. Pretesting or piloting was used in both Cai and Lee and Van Zeeland's studies as a check for construct validity to determine whether the participants responded as intended and that the items assessed what it was designed to assess—skill in noticing unfamiliar words. Among the four assessments, the only form of reliability reported was interrater reliability. Cai and Lee reported interrater reliability for coding the think aloud protocol that was used to determine participants' strategy use for figuring out unfamiliar words, which included the code, "no attention," which participates did not indicate noticing the unfamiliar word. The authors reported 95% agreement for coding strategy use.

Overall, these four assessments provide some information on possible methods for developing an assessment of skill in noticing unfamiliar words. For example, these assessments demonstrate the efficiency of using pseudo-words as unfamiliar words in that they guarantee they are likely unfamiliar to all participants. The studies also provide methods for increasing the

likelihood that non-target words are familiar to participants. The studies also demonstrate that the rate of noticing unfamiliar words may be more difficult while listening than while reading and that texts that are too challenging may impede learners' in attending to particular words. Given that young children are gaining independence in reading, a listening context may be more appropriate. However, consideration for this difference in reading versus listening should be considered.

None of the assessments provide a thorough report of validity and reliability, which strongly suggests that an assessment that extensively reports evidence of validity and reliability in measuring skill in noticing unfamiliar words within contexts does not exist. The goal of the present study is to add to the research on young children's skill in noticing unfamiliar words within context by developing an assessment of this skill and carrying out an extensive examination of its validity and reliability. This assessment is important to early vocabulary research because it can help researchers to validly and reliably examine the relationship between children's skill in noticing unfamiliar words and their vocabulary knowledge, vocabulary growth and comprehension. Additionally, such an assessment can be used to inform instructional decisions as it pertains to monitoring and evaluating children's ability to notice unfamiliar words within context.

Research Purpose

The purpose of this paper is twofold. The first is to describe the development of an assessment that measures young children's ability to notice unfamiliar words within context. The second is to report the evidence of the validity and reliability of the assessment.

Methods

This methods section describes the procedures that were followed to design and develop the NUWA relative to the procedures and criteria established by The Standards for Educational and Psychological Testing (American Educational Research Association [AERA], American Psychological Association, & National Council on Measurement in Education, 2014). These standards specify criteria for developing and evaluating tests and their intended uses and recommendations for examining the validity and reliability of interpretations of test scores. This methods section details how test items were developed, reviewed, piloted, and revised prior to administering the assessment to a sample of second graders. After administering the assessment, the validity of the internal structure and reliability of the assessment were examined through statistical analyses including Exploratory Factor Analysis (EFA). I also include intended uses of the assessment, assessment administration procedures, scoring procedures, and address fairness and the rights of test takers in the methods and discussion sections. The following sections discuss the development and testing of the NUWA, which address many of the criteria and guidelines set forth by the standards cited earlier in the paragraph (also see Table 1.1 for information about the alignment of the assessment design and development process with these Standards).

Design of Assessment

The initial version of the NUWA included a pool of 26 items from which a 15-item assessment could be derived. All items feature a three-sentence passage of text that resembles a type of text typical of primary-grade informational books. Each sentence within the passage is related to the same topic. Two types of items are included in the assessment: pseudo-word (PW) items and non-pseudo-word (NPW) items. The items were designed such that all words are likely

familiar to second graders, with the exception of the pseudo-word, in that they are high-frequency English words. *The Corpus of Contemporary American English* and Kuperman, Stadthagen-Gonzalez, and Brysbaert's (2012) ratings of the age of acquisition of 30,000 English words were consulted to determine the familiarity of the words in the passages. All words were either listed in the first 1,000 most frequent words in English or had an age of acquisition at or below the age of eight. The PW items contain one pseudo-word and the NPW items do not contain any. PW items contain a pseudo-word as a target word that children are expected to identify from the passage as unfamiliar. The pseudo-words, while not real words, were designed to mimic phonological patterns of real English words. Pseudo-words were used as target words because they offer the most efficient way to maintain a naturalistic reading situation while also ensuring that children do not know the word (see the Developing Pseudo-Words section for a description of the process for creating the pseudo-words). NPW items do not contain any pseudo-words. The NPW items were included to encourage students to carefully attend to all the words in the passages. It was hypothesized that having items that did and did not contain pseudo-words (serving as unfamiliar words) would reduce the likelihood that children would expect a pseudo-word in every passage, and thus better reflect the real process of reading in which the appearance of unfamiliar words is unpredictable.

Initially, there were 20 PW items and 6 NPW items. The goal was to select 12 PW items and 3 NPW items from this item pool for the final version of the assessment. In this assessment, students' skill in noticing unfamiliar words is assessed using a set of open-ended questions that asks students whether they hear an unfamiliar word, and if they respond affirmatively, what word is unfamiliar. Additionally, students are asked a comprehension question about the passage for the purpose of encouraging children to focus on making meaning of the entire passage to

simulate a more naturalistic reading experience. In the following sections, details regarding the procedures for developing the assessment items and the development of the pseudo-words as unfamiliar target words are discussed as the Standards for Educational and Psychological Testing (AERA et al., 2014), indicate that the procedures for developing, reviewing, and piloting test items should be documented.

Developing assessment items. To develop assessment items, a list of informational topics that second graders are likely to encounter (e.g., weather, time, nutrition, plants) was generated. Such topics were chosen so as to lessen the likelihood that background knowledge would significantly influence children's performance on the assessment. Each item covered a different topic, and each sentence in the passage focused on this topic. Informational text was chosen to align to the Grade 2 Informational CCSS that expect second-grade students to "determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area" (NGA & CCSSO, 2010). As stated earlier, the sentences were written to resemble those found in grade 2 informational texts and to contain only likely familiar words aside from the pseudo-words. As noted earlier, *The Corpus of Contemporary American English* and Kuperman, Stadthagen-Gonzalez, and Brysbaert's (2012) ratings of the age of acquisition of 30,000 English words were consulted to determine the familiarity of the words in the passages. All words were either listed in the first 1,000 most frequent words in English or had an age of acquisition at or below the age of eight. For twenty of the assessment items, a key noun, verb, or adjective was identified to function as an unfamiliar target word. After choosing a target word, the sentences were checked to be sure there were not any explicit contextual aids that children could use to constrain the meaning of the target word and thus lead children to not identify an unfamiliar word as unfamiliar because they judged it as familiar based on the context clue. The passages

were revised to ensure that the location of the target word varied within the passage and that there were a balanced number of nouns, verbs, and adjectives representing the target words. Pseudo-words replaced these target words (see the Developing Pseudo-Words section). The passages of the remaining six items did not feature any pseudo-words for reasons explained in the introduction of this section.

Developing pseudo-words. To ensure that children would not be familiar with the target words in the passages, pseudo-words were created. First, for the 20 PW items, a key noun, verb, or adjective was chosen from either the first, second, or third sentence. The number of nouns, verbs, and adjectives as well as the location of the pseudo-word within the passage was balanced across the items. To create realistic, developmentally appropriate pseudo-words to replace the key words selected from the passages, the following guidelines were applied: 1) an onset of a word from that part of speech was matched to a rime of a word with the same part of speech, 2) the pseudo-word contained no more than three syllables, 3) Merriam-Webster's online dictionary indicated that the pseudo-word was not a real word. For example, the word *candles*, was replaced with the pseudo-word, *haskets*. The onset of the noun, *handles* and the rime of the noun, *baskets* were combined (*h*- and -*askets*). *Haskets* forms a two-syllable word, and there are other words such as *haste* or *ask* that follow the spelling pattern of *haskets*. Another example is the pseudo-word, *fleeding*, which was constructed from the onset of the verb, *flee* and the rime of the *needing* (*fl*- and –*eeding*). *Fleeting* is a real word that follows this pattern. Additionally, Merriam-Webster's online dictionary indicates that neither *hasket(s)* nor *fleeding* are in the dictionary. This same process was followed to create the other 18 pseudo-words.

Evidence of test content validity. Two literacy experts reviewed the assessment items. The items were revised based on their suggestions. The assessment items were also piloted with

10 second-grade students. Wording was changed and the order of the sentences was also changed based on student pilot data. In addition, two primary-grade teachers reviewed the assessment items. They were asked to rate the level of difficulty of the passages with respect to the average second-grade student's listening comprehension skills on a scale of 1 to 5, with 1 being very easy and 5 being very difficult. The teachers rated the sentences without regard for the pseudo-word and the average second grader's decoding skills. The ratings ranged from 2 to 4. The average rating across all the passages was 3. No items were eliminated based on these ratings, which suggests the sentences are likely to be comprehended by second-graders with average listening comprehension skills. The initial version of the assessment administered in the study contained 26 assessment items comprised of passages with an average length of 31.5 words. The Flesch-Kincaid Grade Level readability statistic computed in Microsoft Word was also used to check the readability of the passages. The overall readability statistic for the passages was 3.5. This likely represents the level of most second-grade students' listening comprehension, as learners at this grade level typically demonstrate a listening comprehension level that is higher than their reading comprehension level (Curtis, 1990).

Participants

Second-grade students from two school districts were recruited to represent the racial and socio-economic backgrounds of the metropolitan area of the Midwestern state in which this study took place. One school district served a student population with 72% of students identified as African American and 85% of students from economically disadvantaged homes. The second school district served a student population with 90% of students identified as White and 70% of students not from economically disadvantaged homes. The Department of Education of this Midwestern state designates status as economically disadvantaged when students meet one of the

following criteria: 1) are eligible for free or reduced-price meals, 2) live in households receiving governmental food or cash assistance, 3) are homeless, migrant, or in foster care, or 4) are eligible for certain categories of MEDICAID. The participants in this study included 64 second-grade students from 5 classes within 2 elementary schools in district one and 2 classes within 1 elementary school in district two. The literacy coaches within the districts helped to identify second-grade teachers who were willing to participate. Those teachers who agreed to participate were given consent forms to distribute to their students. The assessment was administered to all second-grade students who received caregiver/parent consent. However, those students who did not answer any of the items correctly were removed from the sample, as it was believed that these students did not understand the task. This decision reduced the sample to 55 participants.

The average age of participants was 8.29. There were 34 female participants (62%) and 21 male participants (38%). Other demographic data may be found in the Table 1.2. The assessment was administered to students from April to June of the 2017 – 2018 school year.

Assessment Administration Procedures

The assessment was administered in ways that are aligned to the Standards for Educational and Psychological Testing (AERA et al., 2014) to consider the rights of the test takers and fairness in testing. The initial version of the assessment included 26 items and took approximately 15 – 20 minutes to administer. I administered the assessment to all students described in the Participants section. The assessment was individually administered to children during normal school hours within the child's school. Each child was asked to assent to participate prior to test administration. I read all directions to the children. After hearing the instructions, children were provided with two practice items for which they were given feedback. The directions read:

In this activity, I am going to read to you. After I read, I am going to ask you to answer some questions about what I read and I will ask you if there are any words you do not know the meaning of. Do you have any questions? Let's practice two questions together.

Next, I read all test items and positioned the assessment so that student could not read any of the items. The assessment items were read to students to avoid the influence of decoding and fluency skills on students' assessment performance. For each item, students could request to have the sentences reread only one time. I wrote student responses, and audio-recorded the testing session if caregiver/parent consent was given to audio-record. The audio-recordings helped to more accurately capture all student responses. For example, in a few cases, the audio recordings helped to more accurately record those mispronunciations of the target word that were difficult to record in a timely fashion by hand. The majority of student responses were easily captured by hand writing them during the assessment.

Scoring Procedures

This section reports scoring procedures, which conform to the criteria of the Standards for Educational and Psychological Testing (AERA et al., 2014). The standards indicate that a scoring protocol should be established. A qualitative coding system was developed to inform the selection of items from the item pool for inclusion in the final version of the assessment.

Each item of the assessment features two types of questions, a vocabulary question and a comprehension question. The comprehension questions were not scored given they simply served to encourage the students to keep a focus on meaning making. Engaging children in making meaning of the passage is more naturalistic in that it focuses children's attention on overall meaning making while also attending to the words. The following section describes how the vocabulary questions were scored.

Vocabulary questions. The PW items were scored dichotomously as 0 or 1 (The NPW items were not scored as part of the total score). After students heard the informational passage, they were asked questions to determine whether they heard an unfamiliar word. First students were asked, "Did you hear any words that you do not know the meaning of?" Students' responses that indicated the following were scored as zero points: "I don't know," no response after five seconds, or "no." Students who answered affirmatively were asked the follow-up question, "Which word or words do you not know the meaning of?" after answering they were asked, "were there any other words that you do not know the meaning of?" Student responses that named the pseudo-word or a close approximation of the pseudo-word earned one point. For example, for the test item, "Bridges are built to help people travel over water. Wood from trees that have fallen can be used to build bridges. Inrectors make sure that bridges are strong and safe," students who answered, "inrectors" or "ractors" earned a score of 1. During the assessment some students identified a word as unfamiliar before they were prompted with the questions. Their response was recorded and they were asked the follow-up question. Students who correctly identified the unfamiliar target word after being prompted were credited in the same manner as students who correctly identified the word without being prompted. Accepting close pronunciation approximations as correct, asking a follow-up question to have children identify the unfamiliar word, and allowing students to identify the unfamiliar target word before the assessment item was read in full were implemented to make the assessment more accessible and fair to learners of this age.

There were six NPW items. The NPW items were only scored to test whether students were performing as expected on these items, meaning that they would correctly indicate that there were not any words that were unfamiliar. Scores on these items were not included in the

factor analysis described later in the paper. NPW item responses were scored on a scale of 0 to 1. Student responses that indicated that there was not an unfamiliar word earned one point. For example, for the test item, "No matter what sport you play, you must practice. Practice helps you get stronger. It also helps you improve your skills and learn the rules of the sport," students who answered "no" when asked, "Did you hear any words that you do not know the meaning of?" earned one point. However, students who responded that there was an unfamiliar word present earned zero points. Students who responded affirmatively were then asked, "Which word or words did you not know the meaning of?" and "were there any other words you do know the meaning of?" Using the same example item as the one above, a student may have named the word *skills* as unfamiliar and was then asked to give an explanation of the word. The students' responses were recorded and later coded qualitatively for the purpose of determining whether the items functioned as designed (that is, to be experienced by the children as having no unfamiliar words). As a reminder, whether the student was able to explain the meaning of the word or not, zero points were earned because the student answered that there was an unfamiliar word present in an item that did not contain a pseudo-word. The following section provides more details related to the qualitative coding.

Qualitative analysis of vocabulary items. A qualitative analysis of student responses to the 26 assessment items was conducted to better understand the different types of student responses and whether students responded in a manner consistent with the purpose of the assessment (see Table 1.3 for coding scheme). To ensure content-oriented validity, those items for which a pattern of student responses indicated that there were words (other than the pseudo-words) contained in the items that were unfamiliar to students were eliminated. Items with 5% or more of students identifying a word other than the pseudo-word as unfamiliar were eliminated.

For example, for this NPW item, “No matter what sport you play, you must practice. Practice helps you get stronger. It also helps you improve your skills and learn the rules of the sport,” about 9% of the students identified *improve* or *sport* as a word that was unfamiliar and they were not able to provide an explanation that indicated that they had knowledge of the words’ meanings. Three NPW items and four pseudo-word items were eliminated based on this criteria. In addition, one PW item was eliminated because one student’s response suggested that the meaning of the pseudo-word could be inferred, which, as stated earlier, was a situation this assessment was designed to avoid. Two other PW items were eliminated as they were judged to contain potentially confusing information. For example, for the item, “Muffins and cupcakes are *ditric*. They both are made with sugar and flour, but they are mixed differently. You should stir cupcake mix more times than muffin mix,” it was decided that this item was confusing because of the multiple meanings of “mix” within the passage; as a noun and as a verb. One other pseudo-word item was eliminated due to 18% of students mispronouncing the pseudo-word in contrast to 0% to 7% of students doing so with the other items. It was judged that due to the high percentage of students mispronouncing the pseudo-word, the item would be difficult to reliably score. After conducting the qualitative analysis of the assessment items, a statistical analysis of the remaining 12 pseudo-word items and the 3 non-pseudo-word items was conducted.

Statistical Analysis Procedures

Test items were examined individually and together to evaluate the reliability and validity of the assessment. First, descriptive statistics for the 15 vocabulary items were computed to analyze the distribution of student responses and to note patterns in students’ responses. Second, correlations among the PW items were computed to analyze the patterns in their relationships. The internal consistency of the 12 pseudo-word items, using the mean inter-item correlation and

Cronbach's alpha, were computed to evaluate the reliability of the scale. Third, an exploratory factor analysis was conducted to test the internal structure of the assessment and to validate that the items in the assessment measured a single latent variable: children's skill in noticing unfamiliar words within text.

Results

Computation and analysis of the means and standard deviations of the 15 items indicated that the items performed as expected. The means of the pseudo-word items were analyzed to detect floor effects or ceiling effects for any of the items. The means ranged from .18 - .49 and their standard deviations ranged from .39 - .50. From this analysis, there did not appear to be any items that suggested floor effects or ceiling effects; in other words, there seemed to be some variance in each of the items. Therefore, at this stage all PW items were retained. The means and standard deviations of the NPW items were also analyzed. As stated previously, the purpose of these items was to check that the students were attending to the intended task of identifying unfamiliar words rather than just identifying any word. It was expected that most students would correctly indicate that there were no unfamiliar words within these items; therefore the means were expected to be high. The means of the 3 NPW items ranged from .93 - .94 and their standard deviations ranged from .23 - .26 (see Table 1.4 for descriptive statistics). Had there been any students who named a word as unfamiliar on two or more of the NPW items, that student's assessment would have been eliminated from the sample, as this would suggest either the student was overly primed to identify a word as unfamiliar or had a lower-than-expected level of vocabulary knowledge. However, this was not the case for any of the students in the sample.

Reliability

The internal consistency of the assessment was conducted to examine the relationship among the 12 PW items. The internal consistency was estimated using both Cronbach's alpha and the mean interitem correlation. The Cronbach's alpha was .84, which suggests strong internal consistency reliability. The mean inter-item correlation was .31. The recommended range for the mean inter-item correlation is between 0.15 and 0.50 (Briggs & Cheek, 1986). The mean inter-item correlation of the 12 PW items falls within the recommended range and indicates adequate internal consistency (see Table 1.5 for correlation matrix).

Construct Validity and Internal Structure

The factor analysis confirmed the stated hypothesis that the assessment is a unidimensional measure of children's skill in noticing unfamiliar words within context. The factor structure of the 12 PW items developed to measure young children's skill in noticing unfamiliar words was examined using exploratory factor analysis with MPLUS Version 8 (Muthen & Muthen, 2017).

The sample size of the present study (N=55) is considered adequate based on simulation studies conducted by researchers, de Winter, Dodou, and Wieringa (2009), who argue the magnitude of factor loadings and the ratio of indicators (p) to factors (f) can be used to determine adequate sample size for factor analysis. In general, they found that factor analysis could still be reliably conducted despite small sample sizes. The higher factor loadings and higher ratios of indicators per factor (p/f) allowed for factor recovery. In de Winter, Dodou, and Wieringa's study, sample sizes between 52 and 64 are considered satisfactory when the number of indicators is between 12 and 24, factor loadings equal .4, and there is only one factor. This study's sample

size of 55 can be considered adequate, as the final version of the assessment is a unidimensional scale with 12 items that have factor loadings all greater than .4.

This exploratory factor analysis was conducted to seek validation of the hypothesis that this assessment measures children's ability to notice unfamiliar words within informational passages of text. Although the assessment included 3 NPW items, only the 12 PW items were included in the factor analysis because the 3 NPW items were not included in the final score. The following paragraphs detail the recommendations and model fit indices used to determine the final version of the assessment.

Analysis of the factor structure of the assessment and further examination of the individual items were guided by Worthington and Whittaker's (2006) recommendations. As explained in the section on scoring, the 12 items were scored dichotomously. Therefore the items were treated as categorical. WLSMV (Weighted Least Squares, Mean, and Variance adjusted) was used to estimate the factor structure and factor loadings. Worthington and Whitaker recommend that an item is retained if its loading has an absolute value of .32 or greater. The following model fit indices were used to judge the fit of the model: MacCallum and Austin's (2000) recommended Root Mean Square Error of Approximation (RMSEA) ≤ 0.05; Hu and Bentler's (1999) recommended Tucker-Lewis Index (TLI) and Comparative Fix Index (CFI) ≥ 0.95; and a Standardized Root Mean Square Residual (SRMR) < 1.

The 12 pseudo-word item version of the assessment was hypothesized to contain a single factor. To test the hypothesized unidimensionality of the assessment, the model fit indices were examined. The 12-item unidimensional model met the criteria for an adequate fit (RMSEA=.02, 90% CI=[.00 .09], CFI=.99, TLI=.99, SRMR=0.14) based on the recommended criteria described in the previous paragraph. Additionally, the factor loadings were examined. The factor

loadings ranged from .45 to .81 and were all statistically significant ($p < .05$). Based on these findings, the 12-item assessment was judged to have adequate construct validity in measuring young children's skill in noticing unfamiliar words in context (see Table 1.6 for items and factor loadings).

Final Version of the Assessment

The final version of the NUWA is a 15-item assessment that includes 12 items containing pseudo-words as unfamiliar target words and 3 items containing no pseudo-words that can be used to reliably assess second graders' skill in noticing unfamiliar words. The total possible score on the assessment is 12. The items that do not contain pseudo-words are not included in the scoring. In the present study, there is evidence that the students' scores varied. The second graders' scores ranged from 0 to 11 and the mean score was 4.02 with a standard deviation of 3.18 (see Appendix A for the final version of the assessment). It was possible that the minimum score on the final version of the assessment is 0 even though students who scored 0 on the initial version of the assessment were dropped because after eliminating poorly functioning items, students' total scores were affected. In the final sample, 11% (6 out of 55) of students scored a 0 on the final version of the assessment.

Discussion

Skill in noticing unfamiliar words within context may be important to literacy development given it is likely to provide children with more opportunities to efficiently learn unfamiliar word meanings during listening and reading. The results of the present study determined that a 15-item assessment including 12 PW items and 3 NPW items has evidence of validity and reliability in measuring second-grade students' skill in noticing unfamiliar words within context. The final form of the assessment requires approximately 10 minutes to

administer. As previously reported, the assessment had adequate internal consistency reliability as estimated by the inter-item correlation and Cronbach's alpha.

This assessment adds to the body of research on skill in noticing unfamiliar words in that it is designed for young children and provides reliability estimates for this type of assessment, which had not been previously reported. This assessment underwent similar content validity checks as those assessments used to measure L2 adult learners' skill in noticing unfamiliar words. In developing the assessment, careful consideration was given to the validity of the content of the test items. Similar to Cai and Lee's (2010) assessment, pseudo-words were chosen as a more efficient method of ensuring the words were in fact unfamiliar, but would mostly be perceived as real words. Van Zeeland (2014) also used nonwords in her noticing unfamiliar words assessment. Just as in the Cai and Lee study, experts reviewed the content of the test items and the test procedures in this assessment. Additional professionals, primary-grade teachers, were consulted to review all test items and provide feedback concerning the realistic nature of pseudo-words and whether all other words in the passages were likely to be familiar to second graders. The teachers were also asked to rate how easy or difficult the passages were for second graders to comprehend while listening. Additionally, the test items were piloted with a small sample of second-grade students similar to Cai and Lee and Van Zeeland's procedures. The pilot study provided additional evidence of construct validity in that the students were able to respond to the assessment in the way in which it was intended, suggesting the items measured what they were designed to measure. The students did not react in ways to suggest that the pseudo-words were not real words. Finally, retention and elimination of test items was informed by qualitative analyses, and analysis of descriptive statistics, correlations, reliability, and the factor structure. These procedures rendered the most valid and reliable form of the assessment.

The NUWA is an important development in early vocabulary research and literacy research more broadly because it has the potential to help researchers and educators better understand whether and, if so, to what degree noticing unfamiliar words is important to children's vocabulary development and literacy skills. The assessment may also allow researchers to uncover whether and, if so, to what degree instruction in noticing unfamiliar words can support children's vocabulary growth. In a study on ambiguity detection, a metalinguistic skill that requires semantic processing, Kamowski-Shakibai and Cairns' (2016) noted that for some children, skill in ambiguity might develop with time. However, instruction in developing ambiguity detection skill early on was found to render positive outcomes. It may stand to reason that skill in noticing unfamiliar words, also a metalinguistic skill that requires semantic processing, may also be improved through instruction. Additionally, there is research with older students that suggests that teaching students word-learning strategies is effective in improving skill in noticing unfamiliar words. The NUWA can be used to find whether similar results can be found with younger students. As discussed earlier in the paper, noticing unfamiliar words is challenging for adult L2 learners as well (e.g., Van Zeeland, 2014). The NUWA provides a means for vocabulary researchers to further investigate the development and the impact of instruction in noticing unfamiliar words on this metalinguistic skill and its influence on vocabulary development as well as listening and reading comprehension.

The psychometric properties of the NUWA also indicate that the assessment has practical merits. The 15-item version of the assessment is estimated to take less than 10 minutes to administer. The assessment instructions are simple and student responses are easy to record and score. Educational researchers and classroom teachers should find this assessment easy to administer and score.

Limitations and Future Research

Although the present study provided evidence of the validity and reliability of the NUWA, a few limitations need to be discussed. First, this study only included students in second grade. It would be important to know whether performance on the assessment by students in other grades would render a similar fit as the second-grade students' data. Additionally, future research should aim for a larger and more diverse sample. The study's sample size was deemed adequate based on factor loadings, the ratio of the number of items and to the number of factors (de Winter, Dodou, & Wieringa, 2009), and the sample primarily included students from two racial backgrounds, black and white. However, within these racial groups, the socioeconomic backgrounds did not vary. Therefore, a larger and more diverse sample would help to investigate differences by demographics. It would also be important to include young English language learners (ELL) in a future study given research shows that ELLs on average enter school with less vocabulary knowledge than native English speakers (e.g., Carlo, et al., 2004). A more diverse sample would also address the fairness in testing standard, which advocates for including the "widest possible range of individuals" (AERA, et al., 2014, p. 64).

Second, the items in the assessment closely resemble passages that may be found in informational texts, however they are not actual passages from published sources. Children's performance of this skill with published texts might differ. Educators should use caution in interpreting results with this limitation in mind. The score generated on this assessment may to a lesser or greater extent represent what a child may do while listening given that the items contain pseudo-words as target words and that children listened to passages of texts that are likely shorter than what would be read or listened to in a more natural context. All the target words

were pseudo-words and not real words, which does not allow for an interpretation of children's skill in identifying words that vary in degree of familiarity.

Third, the item pool could be expanded, or a second assessment developed, to include items that measure children's ability to notice unfamiliar words within narrative texts and also with longer passages of texts. Future assessments or assessment items could also examine this skill when contextual clues are available and in a reading context in which children are reading rather than listening to the items. Such items may help us to better understand more aspects of children's skill in noticing unfamiliar words. These other contexts may add unique contributions to our understanding of this skill and its development.

Fourth, as another test of the reliability of the assessment in line with the Standards of Educational and Psychological Testing (AERA, et. al, 2014), a confirmatory factor analysis with another sample should be conducted in a replication study. A replication study would help to further evaluate the reliability and precision of the assessment. It would also help to interpret the generalizability of the assessment among the students represented in the samples.

Fifth, data on the existing vocabulary knowledge and other relevant component literacy skills of the participants was not collected. This information would be necessary for investigating whether and, if so, how skill in noticing unfamiliar words varies by these factors.

Sixth, future iterations of this assessment should account for how children's working memory influences their performance of skill in noticing unfamiliar words. In the current version of the assessment, children are expected to listen to the passage of text and after the passage is read, they are prompted to decide whether they have heard a word that they did not know the meaning of, and if so, to name the unfamiliar word. It would be important to study children's performance on this assessment in relation to their working memory given that researchers have

found that how children store phonological and semantic information about words in their working memory influences how they make judgments about a word's familiarity (Merriman, Lipko, & Evey, 2008). While the assessment was designed to focus children's attention on meaning, given their developmental stage, it would be important to also consider whether and how some children may be attending only to the phonological form of the word and this may have a bearing on children's vocabulary development. Additionally, given that in general working memory has been found to influence comprehension and in particular working memory tasks that require manipulating sentences and words are highly correlated with comprehension (Cain, Oakhill, & Bryant, 2004), children's working memory capacity should also be analyzed in relation to their skill in noticing unfamiliar words. To account for potential demands on children's working memory capacity, a future study of the NUWA should include a modification that features an immediate non-linguistic response method similar to Van Zeeland's (2014) web-based assessment that required participants to press the spacebar on a keyboard when they heard an unfamiliar word. With this modification, children are able to respond immediately after hearing an unfamiliar word, which may allow them to focus more on meaning making.

Finally, future research should be conducted to refine and develop other vocabulary assessments that help us to better understand skill in noticing unfamiliar words as it relates to word consciousness more broadly, and skill in using word-learning strategies, including lexical inferencing. Future research should also explore using NUWA as a factor within the larger construct of metalinguistic awareness and skill and its ability to predict vocabulary knowledge, application of word-learning strategies, and comprehension skills.

Conclusion

In an effort to support young children's vocabulary development, it is necessary that we have assessments that allow us to measure factors that may contribute to vocabulary growth. Although it is hypothesized that noticing unfamiliar words is related to children's vocabulary development, currently there is no research to support this theory. This assessment provides a means of helping educational researchers determine whether and how this skill contributes to children's vocabulary development and possibly their overall literacy skills. With evidence that this skill matters to vocabulary development and comprehension skills, educators may use this assessment to inform their understanding of children's literacy profiles and to better understand whether and how noticing unfamiliar words may be contributing to a child's skill in lexical inferencing and overall comprehension skills.

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Table 1.1 *Alignment with the Standards for the Educational and Psychological Testing* (AERA et al., 2014)

Standards	Criteria as indicated by AERA et. al., (2014)	Evidence
Foundations		
1. Validity	• Establishes intended use and interpretation • Content-oriented evidence • Evidence regarding internal structure	• Results section • Developing Assessment Items section • Results section
2. Reliability	• Evaluating reliability/precision • Reliability/generalizability coefficients	• Results section • Results section
3. Fairness in Testing	• Test design, development, administration, and scoring procedures that minimize barriers to valid score interpretations for the widest possible range of individuals and relevant subgroups • Accommodations to remove construct-irrelevant barriers and support valid interpretations of scores for their intended uses	• Participants and Limitations and Future Research sections • Assessment Administration Procedures section
Operations		
4. Test Design and Development	• Standards for test specifications • Standards for item development and review • Standard for developing test administration and scoring procedures and materials • Standards for test revision	• Discussion section • Design of Assessment section • Assessment Procedures section • Methods section
5. Scores, Scales, Norms, Score Linking, and Cut Scores	• Interpretations of scores	• Final Version of the Assessment section
6. Test Administration, Scoring, Reporting, and Interpretation	• Test administration • Test scoring	• Assessment Procedures section • Scoring Procedures section

7. Supporting Documentation for Tests	Not Applicable	
8. The Rights and Responsibilities of Test Takers	• Test takers' rights to information prior to testing	• Participants section
9. The Rights and Responsibilities of Test Users	• Validity of Interpretations	• Discussion section
Testing Applications		
10. Psychological Testing and Assessment	Not Applicable	
11. Workplace Testing and Credentialing	Not Applicable	
12. Educational Testing and Assessment	• Design and Development of Educational Assessments • Use and Interpretation of Educational Assessments	• Design of Assessment introduction • Discussion section
13. Uses of Tests for Program Evaluation, Policy Studies, and Accountability	Not Applicable	

Table 1.2
Demographics of Second-Grade Students

	n =55	
	n	%
Sex		
Female	34	61.8
Male	21	38.2
Race/Ethnicity		
Black or African American	13	27.08
Middle Eastern	1	2.08
White	34	70.83
Free or Reduced Price Lunch	20	39.22

Table 1.3 *Qualitative Coding of Vocabulary Items*

Code	Description
	The child:
a	provides no response
b	answers no when there is an unfamiliar target word present
c	names a word that was not present in the passage
d	names a word other than an unfamiliar target word from the passage and is able to provide an explanation that suggests possession of some knowledge of the word's meaning
e	provides information from the passage instead of a word
f	says I don't know
g	accurately says the unfamiliar target word
h	makes a close attempt to accurately say the unfamiliar target word (e.g., says "flas" for the pseudo-word "flast")
i	answers no when there is not an unfamiliar target word present
j	names a word from the passage that is unfamiliar to the particular student as evidenced by not providing an explanation of the word when prompted
k	describes the meaning of the unfamiliar target word but doesn't say the word.

Table 1.4 *Descriptive Statistics for 12 Pseudo-word Items*

Item	Mean	Standard Deviation
flast	0.33	0.47
thirmy	0.45	0.50
trut	0.49	0.50
tredgy	0.33	0.47
blaunt	0.49	0.50
haskets	0.24	0.43
inrectors	0.27	0.45
fleeding	0.36	0.49
varons	0.18	0.39
strimpy	0.34	0.48
plowsers	0.31	0.47
sturry	0.22	0.42

Table 1.5 *Correlation Matrix for 12 Pseudo-word Items*

	flast	thirmy	trut	tredgy	blaunt	haskets	inrectors	fleeding	varons	strimpy	plowsers	sturry
flast	1											
thirmy	.37*	1										
trut	.25	.49*	1									
tredgy	.42*	.38*	.42*	1								
blaunt	.32*	.19	.20	.09	1							
haskets	.25	.18	.22	.16	.37*	1						
inrectors	.36*	.26	.22	.18	.29*	.14	1					
fleeding	.20	.30*	.47*	.12	.39*	.29*	.22	1				
varons	.37*	.33*	.20	.17	.34*	.29*	.13	.43*	1			
strimpy	.31*	.26	.13	.23	.18*	.23	.33*	.33*	.25	1		
plowsers	.29*	.18	.29*	.29*	.32*	.37*	.30*	.31*	.30*	.34*	1	
sturry	.38*	.31*	.10	.38*	.15	.33*	.01	.33*	.55*	.26	.22	1

*$p < .05$.

Table 1.6 *Noticing Unfamiliar Words Assessment Items and Factor Loadings (FL)*

Items	Item Type	FL
1. Roses can be many different colors, such as red, pink, or white. The bright colors **flast** birds and insects. Roses need birds and insects to help them make more roses.	P	.76*
2. Did you know that not all dolphins live in the salty ocean water? Some dolphins can live in rivers. There is **thirmy** water in rivers.	P	.74*
3. Eating breakfast in the morning is good for your brain. When you eat breakfast you can **trut** better. It is also good for remembering what you've learned.	P	.72*
4. Rain comes from clouds. If you pay close attention to clouds, you can guess when it might rain. Rain clouds are gray, large, and low in the sky.	N	n/a
5. Rabbits like to hop around. If you have a pet rabbit, be sure it has a **tredgy** cage. Pet rabbits should also have time outside of the cage to get some exercise.	P	.67*
6. Diamonds are the hardest of all stones. They can be used to cut and crush things. Some people think diamonds are **blaunt** so they wear them as jewelry.	P	.45*
7. Today, we use clocks to tell time. Long ago, the sun, water, **haskets**, and even sand were used to tell time. Some of these were better at keeping time than others.	P	.60*
8. Everyone has feelings. There are many different feelings, such as happy, sad, or surprised. It is important to know the names of different feelings so that you can tell others how you feel.	N	n/a
9. Bridges are built to help people travel over water. Wood from trees that have fallen can be used to build bridges. **Inrectors** make sure that bridges are strong and safe.	P	.59*
10. Squirrels' front teeth are a bit unusual. Their front teeth are orange and they do not stop **fleeding**. Squirrels need to chew on trees to keep their teeth short.	P	.72*
11. Drums have many uses, such as making music. Playing the drums can also be good exercise. People from some **varons** have used drums to talk to others who are far away.	P	.81*
12. A clear sky does not have any clouds. On mornings when the sky is clear, you might see different colors in the sky. The sunlight might look pink or orange.	N	n/a
13. When kittens are first born they do not hear or see very well. The **strimpy** kittens smell to find milk. It is important that they eat soon after they are born.	P	.61*
14. Sharks eat many different animals, such as fish, dolphins, or seals. Sharks are great **plowsers**. Sharks eat other animals by swallowing them whole or they take a few large bites of the animal.	P	.68*
15. **Sturry** birds need to hunt to find their food. They use their claws and beaks to help them find food. They also use their excellent eyesight.	P	.76*

Bold word is the pseudo-word. P = pseudo-word item; N = non-pseudo-word item. *$p < .05$

Appendix 1.A

Noticing Unfamiliar Words Assessment

Overview: This assessment is designed to assess second-grade students' ability to notice unfamiliar words within context. The assessment requires students to identify an unfamiliar word (pseudo-word) while listening to short passages of text. This is an individually administered assessment.

Administration Notes:

- *Read all instructions and items to the student. Do not allow the student to read any parts of the assessment.*
- *Do not give the child feedback on any of their answers.*
- *Record the student's answers to the questions on the response sheet.*
- *Write down the word(s) that the student identifies as unfamiliar on the student response form.*
- *Only reread the sentences again if the child has asked you to reread. Each item should be reread only once.*
- *Wait 5 seconds, if the child does not provide an answer to either question, go on to the next question.*
- *Do not allow the student to revise their answer to the vocabulary question after hearing the comprehension question.*
- *At the student's request, the passage can be reread before the comprehension question only if it was not previously reread.*
- *Do NOT tell the student what any of the words mean (including the pseudo-word) during or after the assessment. If the student asks for help or what the right answer is, please encourage the student to do the best he or she can do.*

Directions: In this activity, I am going to read to you. After I read, I am going to ask you to answer some questions about what I read and I will ask you if there are any words you do not know the meaning of. Do you have any questions? Let's practice two questions together.

Student Name: _____

Date: _____

Noticing Unfamiliar Words Assessment

Practice Items

A. *Read*: The moon is smaller than the sun. During the month, the moon splurches. Sometimes you can see the whole moon and other times you can only see a part of the moon.

Ask: Did you hear any words that you do not know the meaning of?

- *If yes, say:* **Which word or words do you not know the meaning of?**
    - If the student says splurches, say: **Good, you told me you do not know the meaning of splurches.**
    - If the student says a word other than splurches, ask: **Are there any other words that you do not know the meaning of?**
    - If the student says splurches, say: **"Good, you told me you do not know he meaning of splurches."**
    - If the student says a word other than splurches, ask**: Do you know what ___ means?** If the student says what the word means, say, **"You knew that ___ means [whatever the student says]. Remember, you will tell me the words that you don't know the meaning of."**
    - If the student does not say what the word means, say: **Good, you told me you did not know the meaning of _____.**
- *If no, say:* **Do you know what the word splurches means?** [The child will likely say no.] **Remember you will tell me if there are any words that you do not know the meaning of.**

Ask: Which does the author say is smaller, the sun or the moon?

- *Correct answer:* **Yes, the moon is smaller.**
- *Incorrect answer:* **Remember the author said, "The moon is smaller than the sun," so the answer would be that the moon is smaller.**

B. *Read*: At night you can see the moon above shining brightly. Our planet Earth only has one moon. However, other planets have more than one moon.

Ask: Did you hear any words that you do not know the meaning of?

- *If yes, say:* **Which word or words do you not know meaning of?**
    - *After the student answers, say:* **Do you know the meaning of the word ____.** If the student says what the word means, say, **"You knew that ___ means [whatever the student says]. Remember, you will tell me the words that you do not know the meaning of."**
    - If the student does not say what the word means, say: **Good, you told me you do not know the meaning of _____.**
- *If no, say:* **Good, you knew the meaning of all the words.**

Ask: How many moons does the author say the Earth has?

- *Correct answer:* **Yes, the Earth has one moon.**
- *Incorrect answer:* **Remember the author said, "Our planet Earth only has one moon," so the answer would be that the Earth has one moon.**

Say: **Now you will do the rest of these on your own.**

Assessment Items

1. *Read*: Roses can be many different colors, such as red, pink, or white. The bright colors flast birds and insects. Roses need birds and insects to help them make more roses.

   Ask: Did you hear any words that you do not know the meaning of?

   - *If yes, say:* **Which word or words do you not know the meaning of?**
   - **Were there any other words that you do not know the meaning of?**

   Ask: Why does the author say that roses need birds and insects?

2. *Read*: Did you know that not all dolphins live in the salty ocean water? Some dolphins can live in rivers. There is thirmy water in rivers.

   Ask: Did you hear any words that you do not know the meaning of?

   - *If yes, say:* **Which word or words do you not know the meaning of?**
   - **Were there any other words that you do not know the meaning of?**

   Ask: What is one place the author says that dolphins can live?

3. *Read*: Rain comes from clouds. If you pay close attention to clouds, you can guess when it might rain. Rain clouds are gray, large, and low in the sky.

   Ask: Did you hear any words that you do not know the meaning of?

   - *If yes, say:* **Which word or words do you not know the meaning of?**
   - **Were there any other words that you do not know the meaning of?**

   Ask: What does the author say rain clouds look like?

4. *Read*: Eating breakfast in the morning is good for your brain. When you eat breakfast you can trut better. It is also good for remembering what you've learned.

   Ask: Did you hear any words that you do not know the meaning of?

   - *If yes, say:* **Which word or words do you not know the meaning of?**
   - **Were there any other words that you do not know the meaning of?**

   Ask: What does the author say eating breakfast is good for?

5. *Read*: Rabbits like to hop around. If you have a pet rabbit, be sure it has a tredgy cage. Pet rabbits should also have time outside of the cage to get some exercise.

   Ask: Did you hear any words that you do not know the meaning of?

   - *If yes, say:* **Which word or words do you not know the meaning of?**
   - **Were there any other words that you do not know the meaning of?**

   Ask: Why does the author say pet rabbits need time outside of their cage?

6. *Read*: Diamonds are the hardest of all stones. They can be used to cut and crush things. Some people think diamonds are blaunt so they wear them as jewelry.

   Ask: Did you hear any words that you do not know the meaning of?

   - *If yes, say:* **Which word or words do you not know the meaning of?**
   - **Were there any other words that you do not know the meaning of?**

   Ask: What is one thing the author says diamonds can be used for?

7. *Read*: Today, we use clocks to tell time. Long ago, the sun, water, haskets, and even sand were used to tell time. Some of these were better at keeping time than others.

   Ask: Did you hear any words that you do not know the meaning of?

   - *If yes, say:* **Which word or words do you not know the meaning of?**
   - **Were there any other words that you do not know the meaning of?**

   Ask: What does the author say we use today to tell what time it is?

8. *Read*: Everyone has feelings. There are many different feelings, such as happy, sad, or surprised. It is important to know the names of different feelings so that you can tell others how you feel.

   Ask: Did you hear any words that you do not know the meaning of?

   - *If yes, say:* **Which word or words do you not know the meaning of?**
   - **Were there any other words that you do not know the meaning of?**

   Ask: Why does the author say that it is important to know the names of different feelings*?*

9. *Read*: Bridges are built to help people travel over water. Wood from trees that have fallen can be used to build bridges. Inrectors make sure that bridges are strong and safe.

   Ask: Did you hear any words that you do not know the meaning of?

   - *If yes, say:* **Which word or words do you not know the meaning of?**
   - **Were there any other words that you do not know the meaning of?**

   Ask: What does the author say can be used to build a bridge?

10. *Read*: Squirrels' front teeth are a bit unusual. Their front teeth are orange and they do not stop fleeding. Squirrels need to chew on trees to keep their teeth short.

    Ask: Did you hear any words that you do not know the meaning of?

    - *If yes, say:* **Which word or words do you not know the meaning of?**
    - **Were there any other words that you do not know the meaning of?**

    Ask: What does the author say is the color of a squirrel's front teeth?

11. *Read*: Drums have many uses, such as making music. Playing the drums can also be good exercise. People from some varons have used drums to talk to others who are far away.

    Ask: Did you hear any words that you do not know the meaning of?

    - *If yes, say:* **Which word or words do you not know the meaning of?**
    - **Were there any other words that you do not know the meaning of?**

    Ask: What does the author say is one way that people use drums?

12. *Read*: A clear sky does not have any clouds. On mornings when the sky is clear, you might see different colors in the sky. The sunlight might look pink or orange.

    Ask: Did you hear any words that you do not know the meaning of?

    - *If yes, say:* **Which word or words do you not know the meaning of?**
    - **Were there any other words that you do not know the meaning of?**

    Ask: What does the author say a clear sky looks like?

13. *Read*: When kittens are first born they do not hear or see very well. The strimpy kittens smell to find milk. It is important that they eat soon after they are born.

    Ask: Did you hear any words that you do not know the meaning of?

    - *If yes, say:* **Which word or words do you not know the meaning of?**
    - **Were there any other words that you do not know the meaning of?**

    Ask: What does the author say that kittens do to find milk?

14. *Read*: Sharks eat many different animals, such as fish, dolphins, or seals. Sharks are great plowsers. Sharks eat other animals by swallowing them whole or they take a few large bites of the animal.

    Ask: Did you hear any words that you do not know the meaning of?

    - *If yes, say:* **Which word or words do you not know the meaning of?**
    - **Were there any other words that you do not know the meaning of?**

    Ask: What does the author say is one way that sharks eat other animals?

15. *Read*: Sturry birds need to hunt to find their food. They use their claws and beaks to help them find food. They also use their excellent eyesight.

    Ask: Did you hear any words that you do not know the meaning of?

    - *If yes, say:* **Which word or words do you not know the meaning of?**
    - **Were there any other words that you do not know the meaning of?**

    Ask: What is one thing the author says birds use to help them find food?

Chapter 2: Teaching Second Graders Strategies for Ascertaining the Meaning of Unfamiliar Words from Context

Abstract

There is limited research on vocabulary instruction that develops primary-grade students' skill in ascertaining the meaning of unfamiliar words from context. It is important that we understand how this skill develops with young children given that research with older students has indicated that such instruction is beneficial to vocabulary development. In addition, standards documents expect young children to use this skill during reading. The purpose of this study was to evaluate the effects of a vocabulary intervention that teaches second-grade students to apply word-learning strategies to ascertain the meaning of unfamiliar words when encountered in informational grade-level text. The study used a randomized controlled trial design, assigning 78 second-grade students to either participate in fifteen 30-minute vocabulary lessons that taught multiple word-learning strategies over the span of six weeks or to continue business-as-usual instruction (which was documented using a survey and observations). Participants were assessed on their skill in noticing unfamiliar words within context and their skill in ascertaining the meaning of unfamiliar words from context. Multiple regression analyses revealed that the intervention had a positive statistically significant effect on developing second graders' skill in noticing unfamiliar words within context. However, there was statistically significant difference found between students who were taught the word-learning strategies intervention and the control group in using context clues to ascertain the meaning of unfamiliar words from context. Implications and recommendations for future research are discussed based on these findings.

The Common Core State Standards for English Language Arts and Literacy expect that students as early as first grade demonstrate the skill in determining and clarifying the meaning of words encountered in grade-level texts (NGA & CCSCO, 2010). Primary-grade students' ability to do this is key given that a large body of research has demonstrated that vocabulary knowledge is a significant predictor of reading comprehension across the developmental span (e.g., Snow, Tabors, Nicholson, & Kurland, 1995; Spira, Bracken, & Fischel, 2005). Unlike the body of studies on instruction for older students, there is limited research regarding the efficacy of teaching primary-grade students strategies to ascertain the meaning of unfamiliar words from context. Studies with students in the upper grades show that instruction in word-learning strategies has positive effects on developing learners' skill in ascertaining the meaning of unfamiliar words from context (Fukkink & deGlopper, 1998; Hairrell, Rupley, & Simmons, 2011; Kuhn & Stahl, 1998). Research also indicates that, although the ability to ascertain the meaning of unfamiliar words from context varies among individuals, word-learning strategy instruction, particularly contextual analysis, is effective for students with varying levels of vocabulary knowledge and comprehension skills (e.g., McKeown, 1985; Shefelbine, 1990).

Currently, most of the research on vocabulary instruction for primary-grade students has focused on the direct teaching of word meanings (e.g., Beck & McKeown, 2007). However, it is not feasible to directly teach the meanings of the large number of words found in school texts (Nagy & Anderson, 1984). Indeed, children gain most of their vocabulary knowledge incidentally through oral and written context (Sternberg, 1987). Therefore, supporting young children's ability to apply word-learning strategies may help them to build more vocabulary knowledge as they interact with texts.

The critical role vocabulary knowledge plays in comprehension makes it imperative that vocabulary instruction begin as early as possible, particularly for children who enter school with relatively limited vocabulary knowledge. Children from low-socioeconomic-status (SES) environments are more likely to enter school with relatively limited academic vocabulary knowledge in comparison to children from wealthier or professional families (Fuller, Eggers-Piérola, Holloway, & Rambaud, 1996; Hoff, 2006; Neuman & Celano, 2001). Vocabulary instruction that teaches primary-grade students to ascertain the meaning of unfamiliar words from context may help to accelerate their vocabulary growth as they gain independence in using strategies to learn new word meanings during listening and reading activities (Neuman, 2011). Nash and Snowling's (2006) study with 7- and 8-year-old children from working class backgrounds is one of the few studies that indicate that explicitly teaching young children contextual analysis strategies can increase their vocabulary knowledge and comprehension of text featuring previously taught vocabulary. However, their study focused on teaching just the one word-learning strategy (contextual analysis). After systematically reviewing vocabulary studies conducted with students in grades K – 12, Wright and Cervetti (2017) suggested that self-monitoring understanding of word meanings and employing multiple flexible word-learning strategies when encountering unfamiliar words is more likely than single-strategy instruction to have positive effects on students' general reading comprehension.

Although word-learning strategies hold promise for supporting students' vocabulary development, existing research provides little guidance to teachers about effective approaches for teaching these skills to young children. Therefore, the purpose of this study was to examine the effects of teaching second-grade students from low-SES environments multiple word-learning strategies. Specifically, the vocabulary intervention taught second-grade students how to self-

monitor and clarify their comprehension of unfamiliar words and to use context clues to ascertain the meaning of unfamiliar words when encountered in grade-level informational texts.

Literature Review

This study was informed by three bodies of research on vocabulary development and instruction: (a) metacognition and word-learning strategy instruction; (b) contextual analysis strategy instruction; and (c) combined metacognitive strategy instruction and contextual analysis strategy instruction. The following sections discuss the existing literature within these areas.

Metacognition and Word-Learning Strategy Instruction

Metacognition is an important part of many learning processes, including the way we learn words. Kuhn (2000) defines metacognition as "cognition that reflects on, monitors, or regulates first-order cognition" (p. 178). Flavell (1979) describes an example of a metacognitive experience as a moment of realization that comprehension has been compromised. Such metacognitive experiences are important to the word-learning process as they cue children to assess their understanding of words during listening and reading, which may prompt them to make decisions regarding whether and how to determine and clarify the meaning of a word. For these reasons, many scholars, including Nagy and Scott (2000), have identified metacognition as an important aspect of developing independence in word learning and building vocabulary knowledge.

The metacognitive processes of knowing when, how, and why to use particular strategies are essential to effectively employ word-learning strategies (e.g., Paris, Lipson, & Wixon, 1983; Stahl & Fairbanks, 1986). In particular, learners who engage the metacognitive processes of judging whether and how particular words are important to comprehending a text are more likely to notice unfamiliar words. It is possible that young children's skill in noticing unfamiliar words

provides them with more opportunities to learn the meaning of unfamiliar words, which research suggests is related to vocabulary knowledge, at least in Cai & Lee's (2010) study with L2 adult learners. Research conducted with adult learners has identified factors such as background knowledge, existing vocabulary knowledge, and working memory as affecting skill in noticing unfamiliar words (Cai & Lee, 2010; Van Zeeland, 2014).

Metacognitive strategy instruction studies. Although skill in using metacognitive strategies, such as noticing unfamiliar words, varies among learners, there is research to suggest that instruction can improve these skills, although most of it has been conducted with students older than those who are the focus of this paper. Hairrell, Rupley, and Simmons (2011) conducted a systematic literature review of vocabulary studies to identify strategies that improve students' vocabulary knowledge. The three studies (Bouleware-Gooden, Carrekaer, Thornhill, & Joshi, 2007; Lubliner & Smetana, 2005; Twyman, McCleery, & Tindal, 2006) that included metacognitive word-learning strategies indicated positive results to varying degrees. These studies, with students in grades 3, 5, and 8, investigated the use of strategies, such as self-monitoring comprehension of unfamiliar words and regulating the employment of word-learning strategies to ascertain unfamiliar word meanings from context to increase comprehension skills. The effect sizes reported in these studies ranged from .16 to 1.94 (Hairrell, Rupley, & Simmons, 2011). In a more recent study that examined teacher talk relevant to kindergarteners' general vocabulary knowledge, which included drawing students' attention to unfamiliar words, researchers found that gains in general vocabulary knowledge were positively related to teachers' word consciousness talk (Neugebauer, et al., 2017). However, Neugebauer et al. (2017) did not include a comparison group; therefore, it is not clear whether there is a causal relationship between teachers' word consciousness talk and children's general vocabulary knowledge. The

results of these studies are promising in that they suggest that teaching students metacognitive strategies to monitor and guide strategic word learning can improve both vocabulary knowledge as well as comprehension skills. However, further investigation of the effect of teaching metacognitive word-learning strategies is needed for primary-grade students.

Contextual Analysis for Vocabulary Acquisition

Contextual analysis is one strategy that learners employ to ascertain the meaning of unfamiliar words from context. Baumann, Edwards, Boland, and Font (2012) describe contextual analysis as "infer[ing] the meaning of a word by scrutinizing surrounding text for syntactic and semantic cues provided by preceding and succeeding words, phrases, and sentences" (p. 143). To add to this description in consideration for texts written for young learners, other researchers have included pictorial context as another source for clues about the meaning of words (Parault Dowds, Rogers Haverback, & Parkinson, 2016).

Systematic reviews of research on strategy instruction aimed at building skill in ascertaining word meanings from context have indicated that such instruction is effective. For example, Fukkink and deGlopper's (1998) meta-analysis of 21 contextual analysis intervention studies found a moderate effect of .43 for teaching students to use context to derive the meaning of words. The studies in the review were conducted with students whose ages ranged from 8 to 18.5 years old (the lowest grade level was third). Across the studies there were five different types of trainings or instruction used to teach students to derive word meanings from context: context clues, cloze, strategy, definition, and practice-only. Context clues instruction was described as instruction that teaches students one or more different context clues and how to use them to figure out the meaning of unfamiliar words. Cloze instruction was described as instruction that sensitizes students to the interrelatedness of words by purposely omitting a word

from the sentence for students to figure out. Strategy instruction was described as instruction that generally teaches students to use context to derive the meaning of unfamiliar words, without explicit attention to the types of context clues. Definition instruction was described as teaching students to use both prior knowledge and context clues to construct a definition of an unfamiliar word's meaning. Practice-only was described as no instruction but rather providing students with exercises to practice using context to derive unfamiliar word meanings. After conducting a synthesis of 14 vocabulary studies, Kuhn and Stahl (1998) cautiously suggested that practice-only instruction (e.g., Sternberg, 1987) was just as effective as explicit contextual analysis strategy instruction in building skill in deriving word meanings from context. The researchers found that there was no difference in participants' ability to derive word meaning from context in studies (N=4) that compared specific strategy instruction to "practice-only" conditions. The researchers suggested that whether it is practice or instruction, focusing children's attention on words may be the driving factor in helping children derive word meanings and not the strategies themselves.

In a more recent review of 24 vocabulary studies (13 of which focused on contextual analysis) that were published since Fukkink and deGlopper's (1998) meta-analysis, Hairrell, Rupley, and Simmons (2011) also found that contextual analysis instruction is an effective method for increasing vocabulary learning. The studies were conducted with students in grades 2 – 6. The effect sizes ranged from a partial eta-squared of 0.5 (Cain, 2007) to a Cohen's d of 3.17 (Nash & Snowling, 2006). These studies represented a variety of approaches in teaching contextual analysis strategies, such as teaching particular context clues (Baumann, Edwards, Boland, Olejnik & Kame'enui, 2003) and semantic mapping (Nash & Snowling, 2006).

Hairrell et al.'s (2011) systematic review of vocabulary studies included three studies of young children's skill in ascertaining word meanings from context. These studies were conducted with 7- and 8-year olds. The studies investigated how texts and instruction play a role in children's ability to derive word meanings from context. Cain (2007) examined how different types of feedback influenced young children's skill in deriving word meanings from supportive context. The 45 children participated in one of three types of interventions. The intervention included four sessions; the first was used as a pretest and the fourth was used as the posttest. Children were read a short story that contained a novel word (e.g., bope). At the end of the story, the children were asked to define the word. One group was asked to provide a justification of their definition and afterwards they were given feedback on the accuracy of their definition. The second group was provided feedback on their definition and then asked to provide an explanation of how the researcher knew the correct answer. The third group only received feedback on the accuracy of their definition. The children's definitions and explanations were analyzed. Findings indicated that across the groups, practice using supportive context improved children's skill in ascertaining word meanings from context and that children who were asked to explain their answer or the researchers' answers performed better than the children who were only given feedback.

Nash & Snowling (2006) also investigated children's skill in ascertaining word meanings from context, but over a longer period of time and with students identified as having poor existing vocabulary knowledge. Twenty-four children from a school in a working class community were taught either definitions or contextual analysis using semantic mapping to figure out the meaning of unfamiliar words from context. The intervention consisted of two 30-minute sessions over the course of 6 weeks. The pretests and posttests included assessments of

children's general reading comprehension skills, passage comprehension, vocabulary knowledge of the words included in the intervention, and skill in deriving the meanings of words not included in the intervention. The results indicated that although there was no statistically significant difference in the groups' performance on the vocabulary assessment of taught words immediately after the intervention, the children who participated in the contextual analysis group scored statistically significantly higher in expressing word meanings on the deriving word meanings from context assessment. Also, on the passage comprehension assessment, there was a statistically significant difference in children's performance on the vocabulary dependent questions, favoring the children who participated in the contextual analysis group.

Cain, Oakhill, and Elbro (2003) found that context plays a role in children's ability to ascertain word meanings from context. With two groups of fifteen 7- and 8-year old children, the researchers investigated how the proximity of supportive context to a novel word (e.g., gromp) within narrative passages affects children's ability to ascertain the meaning of an unfamiliar word. The study included children who demonstrated normally developing reading comprehension skill and children who demonstrated weak reading comprehension skill. The children were asked to read eight passages of texts that included useful information from which the meaning of the novel word could be derived. The information was either placed near the novel word, in the following sentence or farther away from the novel, after some "filler" sentences. The researchers scored students' responses to questions about the meaning of the novel word. They found that children who demonstrated weak comprehension skill were less skilled in ascertaining the meaning of the novel words than children who demonstrated higher reading comprehension skill. They also found that children who demonstrated weak comprehension skill had more difficulty ascertaining the meaning of novel words when

supportive information was farther away. Although, Cain, Oakhill, and Elbro's study is not an intervention study, these findings suggest that in supporting less skilled readers in using context to ascertain word meanings, consideration for the proximity of the context clue or supportive information is necessary.

Taken together these studies indicate that young children can demonstrate skill in ascertaining word meanings from context and that instruction can influence the development of this skill. Cain, Oakhill, and Elbro's (2003) study demonstrates that context is important to young children's skill in ascertaining word meanings from context and Cain (2007) and Nash and Snowling (2006) demonstrate that explaining how word meanings are derived from context and instruction in semantic mapping can influence children's skill in ascertaining word meanings from context. Contextual analysis can also be taught using specific types of context clues, however such studies have been primarily conducted with older students.

Context clues instruction. Scholars have recommended the use of context clues as a word-learning strategy (e.g., Graves, 2006; Silverman & Hartranft, 2015). Silverman and Hartranft (2015) recommend that contextual analysis strategy instruction in the primary grades focus on the specific clue types used in Baumann et al.'s (2003) study (e.g., definition, synonym) with the addition of picture clues. The recommendation to use these clue types is supported by the context clue classification system that was derived from a systematic study of the types of clues found in narrative and expository texts written for children ages 4 – 8 and for children ages 9 – 12 (Parault Dowds, Rogers Haverback, & Parkinson, 2016). Some of these recommended context clues, including picture clues, are part of this system. In Baumann et al.'s (2003) study of teaching specific context clues to develop students' skill in contextual analysis, the researchers demonstrated that teaching students to use context clues, specifically, synonym, antonym,

definition, example, and general clues as well as morphological analysis, was effective in teaching fifth graders to infer word meanings. However, it is not clear what the effects of this type of instruction are on early elementary students' skill in ascertaining unfamiliar word meanings.

Baumann et al.'s (2003) study used a quasi-experimental design to examine the effects of teaching morphemic and contextual analysis (MC instruction) with a racially and socio-economically diverse sample of 157 fifth-grade students. MC instruction included 45-minute lessons that were embedded into the social studies curriculum with 15 minutes spent on vocabulary. Students in the MC group were taught to use the Vocabulary Rule, a procedure for what to do when encountering an unfamiliar word to figure out its meaning. The lessons followed earlier descriptions of the Gradual Release of Responsibility (GRR) Model (Pearson & Fielding, 1991; Pearson & Gallagher, 1983). The lessons provided explicit instruction in the types of morphemic and contextual analysis clues, modeling, guided practice, and independent practice in using the word-learning strategies. In the textbook vocabulary (TV) instruction group, students were directly taught the meaning of the content words from the textbook. TV students were not taught to use word-learning strategies, but rather used reference materials, such as the glossary or class dictionaries to find the word meanings. Other strategies included comparing and contrasting, predicting, and semantic maps. Students in both groups were encouraged to collect vocabulary words in a notebook. Results of the study indicated that although the TV group outperformed the MC group on knowledge of the textbook vocabulary, MC students scored significantly higher on an assessment of the students' ability to derive the meaning of words based on their word parts, suggesting that the MC students were better positioned to learn words beyond those in the textbook. In addition, the MC students outperformed the TV students on the

delayed posttest of inferring word meanings from both morphemic and contextual clues. No effects were found on comprehension measures. The findings in this study further support the role of multiple strategy instruction in morphological analysis and contextual analysis (use of specific context clues) in building generative word-learning skills and also that the GRR model is an effective means to help students gain independence in applying strategies. However, as stated earlier, more research is needed to better understand how teaching contextual analysis through context clues supports young children's skill in inferring word meanings and also the efficacy of teaching young children to flexibly use multiple word-learning strategies.

Combining Metacognitive Strategy and Contextual Analysis Instruction

Few studies have investigated the effects of vocabulary instruction that combines metacognitive strategy instruction with contextual analysis instruction as a multi-faceted approach to teaching vocabulary. However, Lubliner and Smetana's (2005) study of an intervention called the Comprehensive Vocabulary Development (CVD) program is an exception. Lubliner and Smetana explicitly taught these strategies and others (e.g., morphology) and reported the effect on students' metacognition as it relates to word learning.

Lubliner and Smetana (2005) designed the CVD to include explicit instruction that explained how skill in using word-learning strategies is important to vocabulary learning and reading. The CVD also taught students cognitive strategies to monitor comprehension of text and vocabulary. For example, the students were taught to self-monitor their level of familiarity of words and contextual word learning strategies (context clues and morphological analysis). The researchers found that fifth-grade students from low-SES environments attending a low-performing school improved in their ability to self-monitor their familiarity with words. Additionally, these fifth graders made significant gains from pretest to posttest on vocabulary

and comprehension measures. In comparing these students' vocabulary and comprehension scores to the comparison group's scores (fifth graders attending an above-average performing school), it was found that there was a large significant difference in the students' vocabulary and comprehension scores at pretest favoring the students in the above-average performing school. However, at posttest there was no statistically significant difference between the two groups' performances on the vocabulary and comprehension tests, suggesting that the CVD was effective in narrowing the initial gap in performance.

The results of Lubliner and Smetana's study (2005) provide compelling evidence that word-learning strategy instruction that develops children's metacognitive skills to notice unfamiliar words and to guide their thinking in using taught word-learning strategies, including contextual analysis and morphological analysis, shows promise for improving and possibly accelerating the vocabulary development of children from low-SES environments. It is possible that adapted forms of the metacognitive self-monitoring and clarifying strategies from Lubliner and Smetana's study can help younger students notice unfamiliar words and to apply strategies to learn unfamiliar word meanings when inconsistencies in word knowledge and comprehension arise.

Summary

As outlined in this literature review, extant research supports the hypothesis that teaching children word-learning strategies may have positive effects on children's vocabulary development. Instruction that explicitly reveals to young children the cognitive processes and the ways to interact with texts may help them to become good word learners. Previous research on word-learning strategies has primarily focused on learners in grades 3 and higher. However, the few studies that have focused on young children's skill in ascertaining word meanings from

context show promise. All children, particularly those from low-SES environments, may benefit from word-learning strategy instruction that teaches them to effectively use context to learn about words, comprehend text, and to learn more word meanings. In other words, it may be beneficial for children to become skilled in applying word-learning strategies to comprehend the task at hand and to add to their existing vocabulary knowledge. In addition, teaching word-learning strategies to young children simultaneously prepares them as strategic and independent word learners as they are becoming more proficient readers, potentially fueling the generative process of increasing vocabulary knowledge and possibly improving comprehension.

The Present Study

The purpose of this study was to examine the effects of teaching students to notice unfamiliar words in context and to use contextual analysis to ascertain unfamiliar word meanings. The following are the research questions that guided this study:

1. What are the effects of a vocabulary intervention that teaches unfamiliar word detection and contextual analysis strategies on second graders' skill in noticing unfamiliar words?
2. What are the effects of a vocabulary intervention that teaches unfamiliar word detection and contextual analysis strategies on second graders' skill in ascertaining word meanings from context?

Methods

The study is a randomized control trial (RCT) designed to examine the effects of a six-week vocabulary intervention that teaches second graders multiple word-learning strategies. An RCT has the advantages of providing unbiased estimates of the effect of the treatment given the randomization process, and with an adequate sample size, resulting in groups that are balanced on observable and unobservable characteristics (Murnane & Willett, 2011). The following

sections describe the methods used to measure the effect of the intervention on second graders' skill in using word-learning strategies.

Setting of Study

Two districts within a large Midwestern state were recruited to participate in the study. The districts were chosen based on demographic data acquired from the state's Department of Education website that indicated the selected districts serve a high percentage of students from economically disadvantaged households. The state determines students' economic backgrounds based on eligibility for governmental assistance, such as free or reduce-priced lunch or MEDICAID. Based on school data reports from the 2017 – 2018 academic year, the two districts serve student populations in which 80% or more of students are from economically disadvantaged households.

In District 1, students were recruited from five second-grade classrooms within two schools. District 2 students were recruited from two second-grade classrooms within one school. I worked with district and school administrators to recruit participants for the study. Upon receiving approval from the district to conduct the study, the study was explained to teachers. After teachers signed consent forms to participate in the study, I provided caregiver/parent consent forms to be distributed to their students. Only those students whose caregiver or parent consented to their child's participation were included in the study.

In total seven classrooms across three schools participated in the study. From each classroom, students who received caregiver/parent consent were randomly assigned to either participate in the vocabulary intervention or to continue to receive business-as-usual instruction. Care was taken to ensure that an equal number of students from each classroom were represented in both the intervention and control groups. In School A in District 1 there were four second-

grade classrooms. The students within each of these classrooms who were assigned to the intervention group from two of the classrooms were placed in Group 1 (N = 9) and the same was done for students in the other two classrooms to create Group 2 (N = 12). In School B in District 1 there was only one second-grade classroom, therefore Group 3 was comprised of the students who were assigned to the intervention group from the one classroom. In District 2, School C, there were two classrooms. The students who were assigned to the intervention group from each of the two classrooms formed Group 4 (N=10).

Study Participants

The study's sample included 78 second-grade students. Demographic information is based on the information reported by the students' caregiver or parent. Table 1 describes the demographic characteristics of the students. The majority of students spoke English as their primary language and were students of color (87%). Most students received free or reduced-priced lunch, as expected given the state demographic data that indicates an overall high percentage of students coming from economically disadvantaged households. A comparison of the students' demographic data revealed no statistically significant difference between the students in the intervention and control groups based on demographic characteristics ($p < .05$).

Prior to recruiting children for the study, I performed a statistical power analysis to determine the minimum sample size needed to achieve an effect of .27. I chose an effect of .27 based on Nash and Snowling's (2006) experimental study with twenty-four 7- and 8-year old children who were taught vocabulary through definitions or contextual analysis. On a measure of the children's ability to provide explanations of unfamiliar words, the children who were taught contextual analysis outperformed the children who were taught using definitions with an effect size of .27. I used R Statistical Software version 3.4.3 to conduct the power analysis. I ran a

balanced one-way analysis of variance power calculation for two groups (intervention or control), using a power of .8 and alpha of .05. The power analysis estimated that 55 participants were needed in each group, for a total of 110 children. In the present study, only 78 children were included in the sample due to relatively low numbers of returned caregiver/parent consent forms. Therefore, the results of the study are discussed with the knowledge that the study is underpowered.

Classroom Context

Although I taught the lessons to the intervention group, the seven classroom teachers were surveyed about their educational background, teaching experience, and current teaching practices to get an understanding of the business-as-usual instruction and specifically the existing vocabulary instruction.

Teacher characteristics. The teachers varied a great deal in their teaching experience. Their teaching experience ranged from the first year of teaching to 32 years. The average number of years of teaching experience was 17.3 years and the average number of years of teaching second grade was 5.8 years.

Teachers were asked to answer six open-ended questions in order to describe their vocabulary instruction. Teachers were asked, “What does your typical vocabulary instruction entail?” Some teachers reported that vocabulary is taught within the context of their reading program by introducing vocabulary that is featured in the text. Two teachers reported teaching vocabulary through their phonics or spelling instruction. Two teachers also reported discussing the meaning of words and writing sentences using the words. Other instructional practices described by only one teacher each included drawing, direct instruction, interactive notebooks, and modeling the use of context clues to teach vocabulary. Teachers were also asked, “What do

you do if you think your students do not know what a word means?" and "What do you tell your students to do when they do not know what a word means?" Teachers reported using context in different ways to help the students figure out the meanings of words that teachers believed were likely unfamiliar to students. They reported drawing a picture, showing an illustration, creating mental images, giving an example of the word in a situation, and providing help using context clues. Two teachers also reported using dictionaries to define words and engaging students in a discussion of the word's meaning. Some teachers reported similar practices for what they tell students to do if they do not know what a word means, such as creating a mental image and using a dictionary. Some teachers again reported directing students' attention to context by checking the picture, rereading the sentence, or using context clues. Two teachers reported telling students to ask a friend. On the survey, teachers were asked, "When do you teach vocabulary, if at all?" and "About how many minutes does this vocabulary instruction last?" Three teachers reported teaching vocabulary in all content areas and four teachers reported teaching vocabulary during reading instruction. Overall, when teachers taught vocabulary, they reported that the sessions were between 5 – 10 minutes long. Teachers were asked, "What program or curriculum do you use to teach vocabulary (if at all)?" Most teachers reported that they did not use a specific program for vocabulary. Some teachers indicated teaching the vocabulary provided in content area units, such as in science, math, and social studies. Finally, teachers were also asked to fill out a table that indicated how often they engaged their students in the following vocabulary instructional practices: explicitly teaching specific word meanings, providing multiple exposures to word meanings, explicitly teaching word-learning strategies, and word play or word games. Teachers reported engaging students in the first three types of instructional practices about two to three times per week and most teachers did not engage children in word play or word games at

all. Two teachers reported doing so one and two times per week. From this survey, I learned that teachers were engaging their students in some instruction in word-learning strategies, specifically in the use of context clues.

Business-as-Usual Instruction

Classroom observations and conversations with classroom teachers informed my understanding of the regular classroom instruction that occurred while treatment students participated in the intervention lessons. Before and after conducting the intervention, I engaged teachers in discussions about their literacy and vocabulary instructional practices, particularly during the time their students were scheduled to participate in the intervention. I also conducted a classroom observation of all but one classroom during the time children were normally scheduled to participate in the intervention. Children in Groups 1 and 2 participated in the intervention in the morning during their literacy block. Children in Group 1 primarily missed a whole-group read-aloud session with different types of texts that focused on a range of literacy skills, such as text features (e.g., labels, table of contents, diagrams), comparing and contrasting texts, explicit instruction of specific vocabulary words (e.g., *artificial, program, sensor*). Children in Group 2 primarily missed literacy centers, in which they may have been involved in independent reading or using a tablet to engage in apps that developed literacy skills. Children in School B, Group 3 participated in the intervention in the afternoon during writing instruction, in which the teacher modeled how to complete the writing activity and children wrote on a particular topic using their word notebooks to support their spelling as needed. Children in Group 4 also participated in the intervention in the afternoon during a whole class read aloud. The read-alouds focused on reading comprehension skills, such as comparing and contrasting or reading for enjoyment.

Procedures

The study took place from September to December. I administered the pretests over a two-week period. Following the pretests, students were randomly assigned to either participate in the vocabulary intervention or to continue with business-as-usual instruction in their regular classroom. Children assigned to participate in the intervention were taught in four separate groups of 9 – 12 students over the course of a six-week period. They were taught in locations within the school building outside of their classroom, such as the school's media center. The fifteen 30-minute lessons were taught two to three times per week, for a total of 7.5 hours. Immediately following the intervention, I administered the posttests to students in the intervention and control groups.

The Intervention

The vocabulary intervention was designed to support second graders' development of skill in noticing unfamiliar words and skill in using context clues to ascertain the meaning of unfamiliar words from context while listening to informational texts. The following sections describe the structure of the intervention, the lessons and the reading materials.

Structure of the intervention. The word-learning strategies intervention includes fifteen 30-minute lessons taught two to three days per week for five to six weeks. The duration of this intervention was chosen based on Hairrell et al.'s (2011) findings from their systematic review of vocabulary studies that indicated there was no statistically significant difference in the effects of interventions based on the duration of the instruction. However, studies that were longer than four weeks, on average had larger effect sizes than studies that were less than four weeks. Additionally, similar interventions that involved teaching multiple strategies (e.g., Baumann et al., 2003; Lubliner & Smetana, 2005; Nash & Snowling, 2006), including contextual analysis,

were implemented daily or two times per week, and the length of the lessons ranged from 30 – 45 minutes. With consideration for the duration of these previous studies and the age of the children in the present study, I decided that fifteen 30-minute lessons taught two to three times per week might provide sufficient time for children to make gains in their skill in ascertaining the meaning of unfamiliar words from context.

The goal of the intervention was to develop children's metalinguistic awareness and their skill in using metacognitive processes involved in ascertaining the meaning of unfamiliar words from context. All lessons focus children's attention on the importance of vocabulary in reading and listening and promote skill in metacognitive word-learning by teaching children to notice and rate their familiarity of words and to apply a clarifying procedure (PROPS, described in the following section) by using context clues to ascertain the meaning of unfamiliar words. The structure of the intervention is such that there are three types of lessons: an introductory lesson, context clue lessons (synonym clues, picture clues, definition clues, antonym clues), and review lessons. There is one introductory lesson, two to three lessons for each type of context clue and four review lessons. Each context clue lesson progresses in difficulty in locating context clues. The lessons are designed to teach children that context clues are both explicitly and implicitly presented in texts. For example, a definition clue may include an explicit cue word, such as *means* or a definition clue may need to be implied from the structure of a sentence that includes a comma. Each context clue is introduced with an explanation and cue words that can help a reader find the context clue. The following lesson teaches children how to find the specific context clue without the support of a cue. For example, over the course of two lessons, children are taught the cue words *means, called, is,* and *are* for definition clues and in the following lesson, taught how to find definition clues when these cue words are not present. The review lessons occur after the

first two sets of context clue lessons (synonym and picture clues) are taught and then after the three definition-clue lessons are taught. There are two review lessons taught after the fourth and final type of context clue, antonym clues. The review lessons support children in gaining independence in noticing unfamiliar words and using context clues to ascertain the meaning of unfamiliar words within informational texts. As the intervention progresses, children practice ascertaining the meaning of unfamiliar words by flexibly looking for different types of context clues that are explicitly and implicitly presented. An overview of the lessons can be found in Appendix A.

Introductory lesson. In the introductory lesson, a trade book, *The Word Collector* by Peter H. Reynolds, is read to children to motivate them to notice unfamiliar words and to encourage an appreciation for words. The book features a young boy who is enthusiastic about collecting words and sharing them with others. The book was also used to model how to self-monitor familiarity with words and to convey the need to know how to figure out what unfamiliar words mean. To self-monitor their knowledge of word meanings, children are taught a variation of Stoplight Vocabulary (Lubliner & Smetana, 2005). Stoplight Vocabulary is a ranking system that uses the metaphor of a traffic stoplight to help students to rate their knowledge of a word's meaning. However, based on observations during the pilot study of the lessons, I found that second-grade students (cf. the fifth-grade students in Lubliner & Smetana, 2005) tended to overly choose "yellow," which represented, "I think I have heard this word before." This rating did not seem to push children to really assess their familiarity with the word's meaning and it did not motivate them to attempt to engage in contextual analysis to ascertain the word's meaning. Therefore, only two colors, red and green, are used to rate familiarity of word meanings. Red represents, "I don't know," and green represents, "I can tell

someone what this word means." Using the steps of the Gradual Release of Responsibility (described in the next section), children are taught how to self-monitor their knowledge of word meanings using Stoplight Vocabulary. In this first lesson, the lesson plan calls for a high level of teacher support of children's use of Stoplight Vocabulary to rate their familiarity of the *noticed* target word, however as the intervention progresses, the support is expected to gradually reduce to *little to no support* by lesson 15. A similar progression is employed for teaching children to use context clues to ascertain the meaning of unfamiliar words.

Context clue lessons. The 10 context clue lessons (two synonym lessons, two picture clues lessons, three definition lessons, and three antonym lessons) follow a consistent format: (1) an explanation of why it is important to notice unfamiliar words and to figure out the meaning of unfamiliar words, (2) a review of the previous lesson, and (3) the steps of the Gradual Release of Responsibility (GRR) model (Duke, Pearson, Strachan, & Billman, 2011; Pearson & Gallagher, 1983) to guide students in using strategies to self-monitor their knowledge of word meanings and to ascertain the meaning of unfamiliar words within informational passages of texts. The steps of the GRR are:

1. An explicit description of the strategy and when and how it should be used
2. Teacher and/or student modeling of the strategy in action
3. Collaborative use of the strategy in action
4. Guided practice using the strategy with gradual release of responsibility
5. Independent use of the strategy (Duke, Pearson, Strachan, & Billman, 2011, pp. 64-66)

The following is a sample lesson from the intervention that illustrates the content and how the intervention employs the GRR model to develop second graders' skills in noticing unfamiliar words and ascertaining the meaning of unfamiliar words from context.

In Lesson 11, the first of three antonym clue lessons, the objectives are for students to demonstrate: (1) awareness of unfamiliar words within informational texts (2) skill in self-monitoring familiarity of words with little to no support, and (3) use of antonym clues to ascertain the meaning of unfamiliar words presented in informational passages of text. The lesson begins with a reminder of the importance of noticing unfamiliar words and knowing how to figure out what the unfamiliar words mean. The five-step clarifying procedure, PROPS, which is used in all the lessons for helping children rate their knowledge of the unfamiliar target word's meaning and for ascertaining the meaning of the unfamiliar target words, is reviewed. PROPS stands for (1) **P**ause and check your brain (2) **R**eread, (3) Read **o**n, and (4) Check the **p**icture, and (5) Ask, does that make **s**ense? To begin the lesson the children are read a short informational passage to review using PROPS to notice unfamiliar words and to use implicit context clues (at this point synonym, picture, or definition) to ascertain the meaning of the unfamiliar word. In this lesson children are told to use PROPS to notice the unfamiliar word and to figure out the meaning of the word. The children are reminded what synonym, picture, and definition clues are, but are not told which type of clue is present in the passage. The following passage is read to children:

> Scientists **monitor** whale sounds with special tools. Scientists <u>listen</u> to learn more about how whales talk to each other.

The children are expected to ask the teacher to "pause" reading when they notice the unfamiliar word, *monitor*, and then "check their brains" to determine their level of knowledge of *monitor's*

meaning. The children then use their stoplights to indicate *red* if they do not know what the word means and *green* if they can tell someone what the word means. Those children who choose green are asked to tell a partner what the word means. Children proceed to use PROPS to figure out the meaning of the unfamiliar word with some support.

Next, the GRR model is employed to introduce children to using antonym clues to figure out the meaning of unfamiliar words. This portion of the lesson begins with a high level of teacher responsibility. First an explicit explanation of the concept of an antonym is provided along with examples of words that are antonyms. Children are invited to think of a pair of antonyms and to then talk to a partner to discuss their antonym pairs. During the partner discussions, the teacher provides children with feedback. The teacher then reviews the clarifying procedure, PROPS, and tells children when they can use antonym clues to figure out the meaning of unfamiliar words and how to look for the cue word, *not* to help locate the context clue that can be used to figure out the meaning of the unfamiliar word. The teacher then models how to use PROPS to notice an unfamiliar word and also use an antonym clue to figure out the meaning of an unfamiliar word using a think aloud to reveal to children the metacognitive processes they are expected to also perform. The teacher reads the sentence,

Some music is **agitating** and <u>not calming</u>.

Next, with approximately the equivalent shared support from the teacher and children, two more similarly structured passages are used to collaboratively practice using PROPS to notice unfamiliar words and to figure out their meanings using antonym clues with *not* as a cue word.

During the guided practice step, with less support from the teacher and with children taking on more responsibility in using the strategies, the children receive a copy of another

antonym passage that contains an unfamiliar word and uses *not* as a cue word to practice using PROPS to notice an unfamiliar word, rate their familiarity of the word, and figure out the meaning of the unfamiliar word using an antonym clue. The copy of the passage includes a stoplight to rate their familiarity of the target word's meaning. Children are asked to underline the context clue and to write, in their own words, what they think the word means. During guided practice children continue to receive feedback from the teacher and are asked to verbalize the steps they used to notice the unfamiliar word and figure out its meaning.

Finally, during the independent practice step, similar materials and processes are followed to have children more independently practice the strategies with antonym clues. As needed, children are provided support from the teacher. The lesson concludes with a discussion of the steps children used to notice unfamiliar words and how they ascertained the words' meanings. Children are also reminded of the overall goal of becoming good at learning the meaning of new words to help them become better at listening, reading, writing, and speaking. This lesson plan can be found in Appendix B.

Review lessons. Review lessons are taught after each set of context clue lessons (except the first). The goal is to help students gain flexibility in using the different types of context clues within a more naturalistic context. Therefore, books were created to include unfamiliar words and the types of clues that were previously taught. Some sentences contain explicit cue words to help children find the context clues and some do not. The lesson format of the review lessons follow a similar format as the Context Clue Lessons format, in that it begins with a review of the goal of the intervention, the steps for PROPS, the GRR model, and a recap with feedback from the teacher. However, the GRR model is used as the book is read in whole group to children. For independent practice, the children are provided a copy of a passage similar to those used in

previous lessons to notice an unfamiliar word, rate familiarity of the word's meaning, and find and use a context clue to figure out the unfamiliar word's meaning. In total, four books were written for the review lessons. A description of these books and the informational passages from the Context Clue Lessons and their features can be found in the following section.

Target word selection, informational passages, and books. The reading materials featured in the intervention included one published trade book, *The Word Collector* (Reynolds, 2018), for the introductory lesson as described above and informational passages and books that I created for the Context Clues Lessons and Review Lessons. I chose to create these reading materials to maintain a consistent topic of study, which was sound and music. Given the children were learning a new skill, in a context that was disconnected from their classroom, it seemed consistency in topic would provide continuity in the instruction and also help children focus their judgments of familiarity on the words and not the content. I also chose to create the reading materials because it was highly unlikely that I would be able to find the desired number of books on a single or related topic at grade level and that would contain a sufficient number and variety of the specified context clues. Informational texts were chosen because they were deemed more likely to provide explicit context clues for unfamiliar words.

Target word selection. To choose unfamiliar target words, I first consulted published children's informational texts on the topics of sound and music. I used the books to create a word list and as models for writing the informational passages (a book list can be found in Appendix C). I also used Gardner and Davies' (2014) Academic Vocabulary List to select target words. From these sources, I generated a list of words that I judged to be likely unfamiliar to second graders. After generating a list of likely unfamiliar words, I used the age-of-acquistion (AoA) norms (Kuperman, Stadthagen-Gonazalez, & Braysbaert, 2012) as a metric of familiarity.

Children in second-grade are typically 7 or 8 years old; therefore the majority of words used, such as *murmur* (11.22) or *megaphone* (10.20), had an AoA mean rating of 8.0 higher. An online thesaurus and dictionary were used as resources in writing antonym, definition, and synonym context clues for the unfamiliar words in the passages. Care was taken to choose antonym, definition, or synonym clues that were likely to be familiar to most second graders. I also used the AoA norms in making decisions about the likely familiarity of the words used context clues. Context clue words were used if their mean rating was 7.0 or lower.

Context clues. There is no empirical evidence that suggests a developmental progression in learning to use context clues. Therefore, the sequence for teaching each type of clue was decided based on my belief about the level of difficulty a typically developing second grader may experience in using the context clues. The lessons are designed to increase in difficulty as the children progresses through the intervention. I chose a sequence that I believed would progress from easiest to most difficult: (1) synonym clue, (2) picture clue, (3) definition clue, and then (4) antonym clue. However, given the developing independent reading skills of second graders, it could be argued that picture clues are easier to use than synonym clues. I chose to teach synonym clues first because it is more beneficial for the development of written text reading that children begin to rely more on written text to make meaning than pictorial context. Additionally, synonym clues are text-based one-word clues that represent the concept of similar meaning, which is likely easier to comprehend than the multiple words contained in a definition clue and the concept of difference represented by antonym clues. I chose to teach antonym clues last because they are likely more difficult than the other types of clues for children of this age to process given they require additional steps. For all the context clues, children need to first identify the clue, second, think about what the clue means, and third, understand that the clue

provides information about what the unfamiliar word means. However, with the antonym clues there are additional steps in which the children need to think of the opposite meaning of the clue and find a word that expresses the opposite meaning to understand what the unfamiliar target word means.

Informational passages and review books. I wrote 5 – 7 informational passages for each lesson and books for each of the review lessons. The passages varied in the number of sentences. The placement of the context clue in relation to the unfamiliar target word also varied, in that sometimes the unfamiliar word preceded the context clue and in other cases, the unfamiliar word followed the context clues. The following are examples that represent the informational passages used in the (1) synonym clue lessons, (2) picture clue lessons, (3) definition clue lessons, and (4) antonym clue lessons. In the sentences, the unfamiliar target words are bold and the context clues are underlined, except in the case of the picture clue sentence, in which the clue is circled, and cue words are italicized.

(1) Noise is all around. Even at night, when the house is quiet you can hear the <u>hum</u> *or* the **drone** of the refrigerator.

(2) Sometimes it is hard to hear what people are saying. **Megaphones** can be helpful. (Figure 1: Megaphone.)

(3) Some sounds are **inaudible** to people. **Inaudible** *means* that <u>the sound cannot be heard</u>.

(4) Have you ever wanted to be a drummer? Drumming might look <u>easy</u>, *but* it's **complicated.**

I referenced published trade books on music and sound to inform the content of the review books. For example, I used *Rhythm Ride: A Road Trip Through the Motown Sound* by Andrea Davis Pinkney to assist with writing a biographical book about the musician Stevie Wonder. The following is an excerpt from the book I wrote, *Little Stevie Wonder*, that uses a synonym clue *change* as a clue to the likely unfamiliar word for second graders, *modify*:

"He spent lots of time practicing to **modify**, that is, change his voice."

The AoA mean rating for *modify* is 9.39, a year beyond age eight, and the AoA norm for *change* is 4.39, a few years below age seven. The AoA mean ratings were consulted for all unfamiliar target words used in the intervention. It should be noted that because children vary in the breadth and depth of their vocabulary knowledge and given that real words are used as the unfamiliar target words, there is no way to ensure that words predicted to be unfamiliar to children actually are unfamiliar to all children. Therefore, to reduce the chance that a child would know all words within a lesson that were intended to be unfamiliar and to increase the chance that the words would be also representative of what children this age would encounter within grade level texts, the target words were chosen to cover a range of AoA ratings. The actual range of the AoA mean ratings of the words in the intervention was 6.05 – 17.00. This range increased the likelihood that at least some of the words would be unfamiliar to all children and that all children experienced the intervention in the manner it is was intended—to develop their skill in using word-learning strategies. A list of the unfamiliar target words can be found in Appendix D.

Student Participation

Overall, the attendance rate for the vocabulary intervention group was 87%. Student attendance was variable and ranged from participation in nine lessons to participation in 15 lessons. The majority of students participated in 12 or more lessons.

Student Assessments

Student scores on the Northwest Evaluation Association (NWEA) were obtained from the school as a baseline measure of children's reading skills. To examine the effectiveness of the vocabulary intervention, the Meaning Inference Assessment (MIA; Wise & Duke, 2019) was administered at pretest and again at posttest. The Noticing Unfamiliar Words Assessment (NUWA; Wise, 2019) was also administered at posttest. A description of these assessments is provided below.

Northwest Evaluation Association (NWEA). The NWEA Map Growth reading assessment is a benchmark assessment used by the two school districts in the study to track students' progress. The assessment technical materials assert that it is aligned to the CCSS and measures students' progress in reading informational texts, foundational skills and vocabulary, and reading literature. The assessment is an untimed adaptive computerized assessment. The assessment uses the Rasch Unit Scale to track students' individual growth. For second-grade students, the rounded mean is 175 (Thum & Hauser, 2015). The sample's mean score on the NWEA Map assessment reading skills was 168.3. The children's NWEA Map scores were included in the study as a means to assess initial intervention/control group comparability.

Noticing Unfamiliar Words Assessment. The NUWA was administered to measure the effects of teaching children strategies to notice unfamiliar words within context. The NUWA is a 15-item assessment that contains 12 pseudo-word items, meaning they are not real words, but were constructed to follow the same phonological patterns of English words so as to guarantee that the words would seem realistic, but would be unfamiliar to all children, and three non-pseudo-word items to create a more naturalistic reading context in which not all words are unfamiliar. The items are comprised of three-sentence informational passages. The passages are

read to children and can be reread up to one time at the child's request. After hearing the passage, children are asked whether they heard a word that they do not know. If the child responds affirmatively, the child is prompted to say the word that was unfamiliar. If the child produces the unfamiliar word, they are awarded 1 point. For example, for the item, "Eating breakfast in the morning is good for your brain. When you eat breakfast you can trut better. It is also good for remembering what you've learned." Children's responses that affirmatively indicated that they heard an unfamiliar word and identified the target word *trut* by saying "trut" or a word that sounded similar to *trut*, such as "chut," were awarded 1 point. Student responses that name a real word from the passage or name a word that is not in the passage are not awarded any points. Only pseudo-word items are scored. The total possible points is 12. The assessment has strong reliability as indicated by a .84 Cronbach's alpha reliability coefficient. The assessment takes less than 10 minutes to administer.

Meaning Inference Assessment. Second-graders' ability to ascertain the meaning of unfamiliar words from context was assessed using the MIA, a 15-item assessment. Each item provides a sentence that features an unfamiliar word and an antonym clue, definition clue, picture clue, or synonym clue that the student could use to ascertain the meaning of the word. After hearing the sentence twice, the student is asked the open-ended question, "What is the meaning of the word ____?" After responding, the student is asked a multiple-choice question, "Which of these choices best describe the meaning of the word ____?" The student chooses—from three options—the word or phrase that best describes the meaning of the unfamiliar word. Students' open-ended responses are scored on a scale of 0 – 3. A score of 0 indicates that the student's response represents no knowledge of the target word's meaning. A score of 1 indicates that the student's response represents limited knowledge of the word's meaning or that the

student repeated the context clue verbatim from the sentence. For example, for the item, "Magicians use card tricks to astound or surprise their audience" with *astound* as the unfamiliar target word and *surprise* as the synonym context clue, a student's response, "surprise their audience" would be awarded 1 point. A score of 2 indicates that the student's response represents more developed knowledge of the unfamiliar word's meaning, such as this response to the meaning of *astound*, "like surprise people, they're like how you do that." Although the response contained the context clue from the sentence, the student elaborated with an example of the word. A score of 3 indicates that the student's response is accurate because it provides either a synonym or an accurate or nearly accurate explanation of the word's meaning. For example, a student's response "shock" would earn a score of 3 because it can be considered a nearly accurate explanation of how the word *astound* was used in the sentence. The multiple-choice items are scored as either correct or incorrect, awarding 1 point for correct responses and 0 points for incorrect responses. The student is asked to choose the best answer from three options. One option is the correct answer, which is either a synonym or a short phrase that describes the word's meaning. The two incorrect responses are distractors. Most item distractors are phonologically and/or semantically related to the target word. For example, the multiple-choice item for *astound* included the choices: *disappear*, *bore*, or *amaze*, with *amaze* as the correct response. The two distractors are semantically related to *astound*. The assessment has strong internal consistency reliability as indicated by a .87 Cronbach's alpha reliability coefficient. For this study, the assessment was administered as a pretest and a posttest to all students in both the intervention and control groups who received parent/caregiver consent to participate.

Data Analysis

To estimate the effects of the intervention on second graders' skill in noticing unfamiliar words and ascertaining word meanings from context, descriptive statistics were computed and analyzed, missing data patterns were computed and analyzed, and ordinary least squares (OLS) regression was used to estimate the difference between the intervention and control groups on the outcomes of interest (the NUWA and the MIA).

Baseline equivalence. To examine the baseline equivalence between the two groups, I first examined the students' NWEA MAP scores, which were used a measure of children's initial reading skills. I also examined the students' scores on the pretest of MIA, which were used as a measure of children's initial skill in ascertaining the meaning of words from context. T-tests indicated that there was no statistically significant difference at pretest between the intervention and control groups on the NWEA MAP assessment ($p < .05$). Similarly, there was no statistically significant difference at pretest found between the two groups on the MIA ($p < .05$). The t-tests indicate that the groups were comparable in their overall reading skills and ability to ascertain word meanings from context prior to the intervention, suggesting that the randomization process was successful (see Table 2.1 for means and standard deviations). Therefore, any difference in the groups' performances on the measures at posttest can be attributed to the effect of the intervention.

Descriptive statistics. The means and standard deviations of the students' performance on the posttests were examined for the entire sample and by invention/control status overall and by demographic characteristics. Overall the students' scores on both assessments at posttest show adequate variance across the sample and within the two groups (see Table 2.2 for raw score means and standard deviations). Students' demographic characteristics including race/ethnicity,

free or reduced-price lunch eligibility, language background, age, or gender did not have much variance in this sample and were found not to be statistically significant in estimating the effect on second graders' performance on the outcome measures. For this reason, the students' pretest score on the MIA was the only control variable used in the regression models.

Missing data. Prior to conducting the regression analyses, patterns in missing data were examined. To start, attrition rates in the study were relatively low, with four students leaving the study due to changing schools (*N*=3) and one student choosing to end participation in the study. The attrition rate was 4.8% which is less than the 10% overall attrition rate standard set by What Works Clearinghouse (WWC, 2017). One other student was removed from the sample because she was not assessed during the posttest period due to absence from school. The number of students who left the study was approximately balanced across the two groups (intervention: *N*=3; control: *N*=2). Given the overall attrition rate and that the two groups are relatively balanced on the number of students who left the study, no further analysis of attrition was conducted.

Student demographic data was collected when students' caregiver/parent provided consent to participate in the study. Caregivers/Parents were informed that they had the option to not provide information on any of the demographic questions and that this choice would not influence their child's eligibility to participate in the study. Therefore, missing data on demographic characteristics, including race/ethnicity (*N* =8), free or reduce-price lunch eligibility (*N*=2), and primary language (*N*= 2) were entered as *did not report*. Caregivers/Parents were also asked for consent to access their child's NWEA reading scores. The scores (*N* =8) for which I did not have permission to access were entered as missing data. Age (*N*=5) was also entered as missing data if a student's birthdate was not provided. Based on Graham, Olchowski,

and Gilreath's (2007) recommendation, I set $m = 50$, for the number of imputed datasets for estimating the missing values on the continuous variables, NWEA scores and age.

Estimating the effects of the intervention. The following analyses were conducted using ordinary least squares regression in Stata 15 to answer the research questions set forth in this study. To address research question 1, regarding the effects of the intervention on second-graders' skill in noticing unfamiliar words, I fit a regression model that estimated the difference between the two groups' skill in noticing unfamiliar words only controlling for children's scores on the MIA at pretest. The coefficient and p-value of the dichotomous intervention/control variable was analyzed to determine the effect of the intervention on second-graders' skill in noticing unfamiliar words. To address research question 2, regarding the effects of the intervention on second-graders' skill in ascertaining the meaning of unfamiliar words from context, I fit a regression model that estimated the difference between the two groups' skill in ascertaining the meaning of unfamiliar words only controlling for children's score on the MIA at pretest. The coefficient and p-value of the dichotomous intervention/control variable was analyzed to determine the effect of the intervention on second-graders' skill in ascertaining the meaning of unfamiliar words from context.

Results

The goal of this study was to examine the efficacy of teaching word-learning strategies to second-grade students by measuring the effects of such strategies on second graders' skill in noticing unfamiliar words, and their skill in ascertaining word meanings from context. The results of the study are reported below.

Impact on Skill in Noticing Unfamiliar Words

The first regression analysis was conducted to estimate the effect of the intervention on second-graders' skill in noticing unfamiliar words. Controlling for students' scores at pretest on the MIA, the analysis indicated that the students who participated in the intervention outperformed the students who did not participate in the intervention (*Cohen's d = .77, p = .001)*). The mean score on the NUWA for students in the intervention group was 6.46 (SD = 3.22) whereas the mean score was 3.82 (SD = 3.55) for students in the control group.

Impact on Skill in Ascertaining Unfamiliar Word Meanings From Context

The second regression analysis was conducted to estimate the effect of the intervention on second-graders' skill in ascertaining word meanings for context. Controlling for students' scores at pretest on the MIA, the analysis indicated that on the MIA posttest, there was no statistically significant difference between second graders who participated in the intervention and those who did not participate ($p < .05$). The mean score on the MIA for student in the intervention group was ($M = 22.65$, $SD = 10.55$) whereas the mean score was ($M = 20.74$, $SD = 8.65$) for students in the control group.

Discussion

The primary goal of this study was to examine the hypothesis that teaching young children multiple strategies for ascertaining the meaning of unfamiliar words from context may improve their skill in noticing unfamiliar words and inferring word meanings from context. I examined this hypothesis by investigating the effects of a word-learning strategies intervention for second graders that taught them how to self-monitor familiarity of words while listening to informational texts and a procedure for inferring word meanings using context clues. I conducted

a randomized controlled trial to examine the effects of the intervention on children's skill in noticing unfamiliar words and inferring word meanings.

In this study I focused on teaching young children multiple word-learning strategies—noticing unfamiliar words and contextual analysis—as a means to support their vocabulary development because although these are recommended vocabulary instructional practices, research on their impact on young children's vocabulary development is limited (McKeown, Deane, Scott, Krovetz, & Lawless, 2017; Silverman & Hartranft, 2015). Nash and Snowling's (2006) study demonstrated that semantic mapping helps 7- and 8-year old children to use context to infer word meanings and Neugebauer et al.'s (2017) study suggests that teachers' word consciousness talk is related to growth in children's vocabulary knowledge. These and other studies suggested that noticing unfamiliar words and skill in inferring word meanings may be effective for improving children's vocabulary knowledge. However, given that multiple strategy instruction may be more effective than single-strategy instruction (Wright & Cervetti, 2017), it is worthwhile to investigate the effects of teaching children multiple strategies that support inferring word meanings. Therefore, I hypothesized that teaching children to notice unfamiliar words within context and engaging in contextual analysis using four types of context clues could have positive effects on young children's ability to notice unfamiliar words and to ascertain word meanings from context. The present intervention had positive effects on second graders' skill in noticing unfamiliar words. However, there was not a statistically significant effect of the intervention on second graders' skill in ascertaining word meanings from context. The implications of these findings are further discussed in the following sections.

Skill in Noticing Unfamiliar Words

The results of this study indicated that the vocabulary intervention has a strong positive effect on second graders' skill in noticing unfamiliar words within context. Students who participated in the vocabulary intervention were taught to attend to unfamiliar words while listening to informational passages and informational books. Once children identified a "new" word, they were prompted to think about what they knew about the word's meaning. To engage children in this metacognitive process, they were prompted to "pause and check their brains" for the meaning of the new word. The children were then asked to judge words as either unfamiliar or known using the color red to represent, "I don't know" and the color green to represent, "I can tell someone what this word means." At posttest, second graders who participated in the intervention were able to identify an average of six to seven words as unfamiliar, whereas children in the control group identified, on average, about four words as unfamiliar on the NUWA, which contained 12 words designed to be unfamiliar (pseudo-words). This finding suggests that during listening activities second graders who are taught to notice unfamiliar words have the opportunity to learn the meanings of more words than children who have not received such instruction, as they are more likely to attend to new words, which invites the opportunity to infer the new word's meaning. Using the Gradual Release of Responsibility model (Duke, Pearson, Strachan, & Billman, 2011; Pearson & Gallagher, 1983) to teach children how to use this strategy and prompting them to "pause and check their brains" when they encounter words they think might be unfamiliar are relatively easy and economical instructional practices that can be inserted into a variety of classroom listening activities.

Cai and Lee (2010) described noticing unfamiliar words as an enabling skill for vocabulary acquisition. This study provides evidence that this enabling skill can be taught to

young children. The present intervention's positive effect on skill in noticing unfamiliar words has important implications for vocabulary development during the early years. Given that vocabulary is learned incrementally, skill in noticing unfamiliar words may be a method for children to more efficiently gain multiple exposures to unfamiliar words, which helps to build vocabulary knowledge.

Skill in Ascertaining Unfamiliar Word Meanings From Context

The results of this study indicated that there was not a statistically significant difference between the intervention and control groups' performance in ascertaining the meaning of unfamiliar words from context. Although on average, the raw scores of students who participated in the intervention increased on this measure more than the raw scores of students in the control group, this difference was not statistically significant. It may be that the young learners needed more time to experience the intervention in order for it to impact not only the prerequisite skill of noticing unfamiliar words, but also using context clues to ascertain word meanings from context. The intervention taught children to use four different types of context clues in a total of 7.5 hours over a period of 6 weeks. Nash and Snowling (2006) found positive effects for teaching children to look for just one type of context clue, descriptive clues, in 12 lessons in a total of 6 hours over a period of 6 weeks. Although, the present intervention taught 3 more lessons in the same period of time, much more content was covered. In the present intervention, four different context clues were taught versus one context clue, and an additional strategy, noticing unfamiliar words, was also taught. It may be that fewer context clues should have been taught in this time frame or an extended time frame for teaching the lessons is needed. Future research should explore increasing the duration of the study, the number of lessons for teaching each type of clue, or decreasing the number of clues taught within a given time period. Additionally, it is also

worthwhile exploring how modifying the intervention to include other types of clues, such as descriptive clues may influence children's skill in ascertaining word meanings from context.

It is also possible that imperfect alignment between the intervention and the MIA may have contributed to the non-significant difference in the groups' skill in ascertaining the meaning of unfamiliar words from context. The MIA assesses children's skill in ascertaining the meaning of unfamiliar words within both narrative and informational contexts. However, the intervention only uses informational texts to teach the children word-learning strategies. It may be that developing skill in ascertaining the meaning of words from context at this age may need explicit instruction with both narrative and informational texts. In similar studies with older students, informational texts were used. However in Nash and Snowling's (2006) study, which found positive effects on 7- and 8-year olds' contextual analysis skills, they used narrative texts. Another difference between the intervention and the MIA is that during the intervention, children were able to read along while listening to the passages when they were ascertaining the meaning of unfamiliar words. However, the MIA is administered in a strictly listening context to avoid children's decoding skills influencing their performance in ascertaining the meaning of unfamiliar words. It is possible that during the intervention, children's skill in ascertaining the meaning of unfamiliar words was supported by being able to read to find clues and that a hybrid listening/reading setting would also support children's working memory, which has been found to be a factor in older students' skill in ascertaining unfamiliar word meanings from context. Future research on this intervention should account for children's working memory capacity relative to their skill in ascertaining word meanings from context while listening. Modifications to the intervention to include narrative texts and strictly listening conditions may help to

elucidate effective instructional practices for improving children's skill in ascertaining word meanings from context.

The intervention taught second graders to use synonym and antonym clues to ascertain the meaning of unfamiliar words. Although, children of this age typically show an increase in the number of synonyms and antonyms they know (Menyuk & Brisk, 2005), it may be that children in this study did not have the vocabulary knowledge that would support making semantic connections between the synonym and antonym context clues and the unfamiliar target words. It is also possible that children this age have not competently developed some of the skills, such as working memory, that are needed to ascertain word meanings from context. Future research on instruction aimed at developing children's skill in ascertaining word meanings from context should be investigated in relation to its effect on children's vocabulary knowledge as well as their working memory capacity.

Additional improvements to the intervention may also help researchers and educators to better understand how multiple word-learning strategy instruction influences young children's vocabulary development and comprehension. In each lesson, the Gradual Release of Responsibility (Duke, Pearson, Strachan, & Billman, 2011; Pearson & Gallagher, 1983) was employed to help children learn to identify an unfamiliar word and to look for clues for the word's meaning, it may be that children this age may also benefit from similar explicit instruction in how to produce an explanation of a word's meaning. Another possible improvement to the intervention would be to reconsider the order in which the different types of clues were taught. As stated earlier, to my knowledge there is no research that suggests a developmental progression for teaching the different types of context clues found in children's texts. I designed the intervention to teach what I believed would be the easier types of context

clues first (synonym and picture). However, it stands to reason that more difficult types of context clues may need to be taught first as it would provide children with more practice in using these types of clues, given that the intervention included a review at the beginning of each lesson and review lessons to help children to learn to flexibly use the different types of context clues.

Limitations

There are some limitations in the present study that are worthy of stating. First, the sample size was smaller than recommended by the power analysis. The power analysis indicated that a minimum sample size of 110 participants was needed to achieve an effect size of .27. This study's sample only included 78 participants. It is unclear whether effects were not detected on children's skill in ascertaining unfamiliar word meanings from context due to the study being underpowered. Therefore, generalizations and interpretations should be made with caution. Second, I was the instructor for the intervention. Although Hairrell, Rupley, and Simmons (2011) found no statistical difference in the standardized effect sizes of the vocabulary studies in which the teacher provided the instruction versus the researcher, caution is still in order when interpreting results relative to ecological validity. Third, the students who participated in the study were taught in groups of 9 to 12 students. These group sizes are not typical of small or whole group instruction in classrooms. Future research should investigate the effects of the intervention relative to group size. Fourth, informational texts were the only types of texts used in the intervention, future studies should modify the existing intervention to include narrative texts to investigate whether and how different types of texts affect young children's ability to apply word-learning strategies. Finally, the current study did not measure the intervention's effect on children's vocabulary knowledge. Therefore, future research should investigate how multiple word-learning strategy instruction with a focus on noticing unfamiliar words is related

to children's vocabulary growth as well as their ability to apply word-learning strategies and incidental word learning from context.

Conclusion

The findings of the present study support the efficacy of teaching young children multiple word-learning strategies and that such instruction has positive effects on developing young children's ability to notice unfamiliar words within context. Developing skill in noticing unfamiliar words may be an important factor in developing vocabulary knowledge as it provides students with more opportunities to learn new word meanings. These are important findings for vocabulary instruction for students in the primary grades as they provide mechanisms for addressing the need for research-based vocabulary instruction focused on word-learning strategies in the primary grades. The findings of this study also indicate promise for helping students meet reading and language standards that require them to determine word meanings from grade-level texts.

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Figure 1. Megaphone. From *Military Members Recognized for Service,* by Canon Air Force Base, 2012 https://www.cannon.af.mil/News/Photos/igphoto/2000097479/. Official United StatesAir Force Website.

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Table 2.1 *Baseline Equivalence*

	Vocabulary							
	Intervention		Control					
Assessment	*M*	*SD*	*M*	*SD*	*t*-statistic	*p*-value	*N*	% missing
NWEA Map	168.2	16.67	168.4	12.12	-.08	.94	70	10.26
Meaning Inference Assessment Pretest	18.8	10.8	16.4	8.45	1.09	.28	78	0.00
N	39		39					

Table 2.2 *Comparisons of Posttest Scores*

	Overall Sample	Intervention group	Control group
Assessment (range)	Mean (SD)	Mean (SD)	Mean (SD)
NUWA (0 – 12)	5.14 (3.62)	6.46(3.22)***	3.82(3.55)
MIA (2 – 45)	21.65 (9.63)	22.56(10.78)	20.74(8.45)

Note. *$p < .05$. **$p < .01$. ***$p < .001$.

Appendix 2.A

Overview of Intervention Lessons

Table 2.0-3 Overview of Intervention Lessons

	Introductory Lesson	**Synonym Clues Lessons**		**Picture Clue Lessons**		**Review Lesson**
	1	2	3	4	5	6
Focus Strategies:	(1) NUW	(1) NUW (2) S.C. (cue word, *or*)	(1) NUW (2) S.C. (implicit)	(1) NUW (2) P.C. (cue, diagrams)	(1) NUW (2) P.C. (implicit)	(1) NUW (2) S.C. and P.C. with and without explicit cues
Objectives:	(1) Students demonstrate awareness of unfamiliar words.					
	(2) Students begin to self-monitor familiarity of words with support.	(2) Students demonstrate skill in self-monitoring familiarity of words *with support.* (3) Students use synonym clues to figure out the meaning of unfamiliar words presented in informational passages of texts.		(2) Students demonstrate skill in self-monitoring familiarity of words *with support.* (3) Students use picture clues to figure out the meaning of unfamiliar words presented in passages of text with accompanying picture.		(2) Students demonstrate skill in self-monitoring familiarity of words *with support.* (3) Students use synonym and picture clues to figure out the meaning of unfamiliar words while listening to an informational text.

Note. NUW = noticing unfamiliar words. S. C. = synonym clue. P. C. = picture clue.

	Definition Clue Lessons			**Review Lesson**	**Antonym Clue Lessons**			**Review Lesson**	**Review Lesson**
	7	8	9	10	11	12	13	14	15
Focus Strategies	(1) NUW (2) D.C. (cue words, *called* and *means)*	(1) NUW (2) D.C. (cue words, *is* and *are*)	(1) NUW (2) D.C. (implicit)	(1) NUW (2) S.C., P.C., and D.C. with and without explicit cues	(1) NUW (2) A.C. (cue word, *not*)	(1) NUW (2) A.C. (cue word, *but*)	(1) NUW (2) A.C. (implicit)	(1) NUW (2) S.C., P.C., D.C., and A.C. with and without explicit cues	
Objectives:	(1) Students demonstrate awareness of unfamiliar words.								
	(2) Students demonstrate skill in self-monitoring familiarity of words *with some support.* (3) Students use definition clues to figure out the meaning of unfamiliar words presented in informational passages of texts with accompanying pictures.			(2) Students demonstrate skill in to self-monitoring familiarity of words *with some support.* (3) Students use synonym, picture, and definition clues to figure out the meaning of unfamiliar words while listening to an informational text.	(2) Students demonstrate skill in self-monitoring familiarity of words *with little to no support.* (3) Students use antonym clues to figure out the meaning of unfamiliar words presented in informational passages of texts.			(2) Students demonstrate skill in self-monitoring familiarity of words *with little to no support.* (3) Students use synonym, picture, definition, and antonym clues to figure out the meaning of unfamiliar words while listening to an informational text.	

Note. NUW = noticing unfamiliar words. S. C. = synonym clues. P. C. = picture clues.
D. C. = definition clues. A. C. = antonym clues.

Appendix 2.B
Sample Lesson Plan

Lesson 11

Word-Learning Strategy – Antonym Clues 4.1

Lesson Objectives:
(1) Students will demonstrate awareness of unfamiliar words.
(2) Students demonstrate skill in self-monitoring familiarity of words with little to no support.
(3) Students use antonym clues signaled by the cue word, *not* to figure out the meaning of unfamiliar words presented in informational passages of texts.

Materials:
- Chart paper/White board
- PROPS poster
- Stoplight pocket chart
- Individual stoplights
- Word Investigating with Antonym Clues Guided Practice Sheet 4.1
- Word Investigating with Antonym Clues Independent Practice Sheet 4.1
- Review informational passage composed with an implicit synonym clue
- Informational passages composed with explicit antonym clues using *not*
- Target word cards for: *monitor*, *agitating*, *bulky*, *lightly*, *stable*, *hunched*, *ambitious*

Whole Group Instruction

Review
- Remind students that they are word investigators—learning how to figure out the meaning of new words. Revisit the steps in PROPS.
- Refer to the stoplight pocket chart and choose a student to describe what each color on the stoplight means. Invite students to modify or confirm the student's response.
- Review noticing unfamiliar words and investigating the meaning of the words using synonym, definition, or picture clues.
- Display the passage: Scientists **monitor** whale sounds with special tools. Scientists <u>listen</u> to learn more about how whales communicate.

- Discuss student responses and give children feedback on their use of PROPS in noticing the unfamiliar words and looking for different types of clues to figure out the meaning of the word. Be sure to mention that although listen was a synonym clue, there was no cue word to help find the context clue.

Explicit Explanation

- Explain to students that there is another type of clue that they can look for in sentences called an antonym clue that can help them figure out what a new word means. Explain that today's work will focus on using antonyms, which are words that mean the opposite or is exactly different from the new word.
- Give examples of antonyms (e.g., no and yes; up and down). Invite children to *Turn and Talk* to think of other words that are antonyms. If needed provide the following words as prompts: day, happy, dry. Both children in the pairs should share examples of antonyms and give feedback to the children. Bring the group back together and reiterate what antonyms are by using student responses that were overhead during the *Turn and Talk.*
- Revisit PROPS, explaining that when we *Reread* and *Read On* we have been looking for synonym or definition clues and now we can also look for antonym clues because authors sometimes use these types of clues as well. Tell students that today's lesson will focus on finding and using antonym clues to figure out the meaning of red stoplight words. Explain that sometimes the author helps you find the antonym clues by using the word *not*. Remind students that figuring out the meaning of red words is important because it helps you learn a lot of different words and knowing what a lot of words mean helps you read, write, listen, and speak well.

Modeling

- Demonstrate to students how to use PROPS with a focus on using an antonym clue with *not* to help ascertain the meaning of a red stoplight/new word. Say, **"I am going to show you how to use PROPS to check your brain for the meaning of words and how to find and use antonym clues that have the word *not* to figure out a red stoplight word's meaning. First, I am going to be sure my ears and brain are ready to pause if I come to a word and I don't know what it means** [gesture getting hears and brain ready]. **I will then check with my brain for the meaning of the word. I will use the stoplight to help me decide if it is a red word, which means I don't know what it means or a green word, I can tell someone what the word means. Listen to this sentence: Some music is agitating and not calming.**
- Think Aloud: Pause after reading the word agitating. Say, **"*Agitating*. I don't think I know what *agitating* means. I am going to underline the word *agitating*. I'm now checking with my brain to figure out whether I know the meaning of *agitating*. Hmmm...*agitating*. I can't tell anyone what the word *agitating* means so this is a red word for me. Now, since I am a word investigator, just like you all, I am going to see if I can find some clues to help**

me figure out what *agitating* means. The next step in PROPS [point to the poster] **is *Reread,* so I will reread the words before *agitating*.** [Read the words before *agitating*.] **I didn't find any clues that help me figure out the meaning of *agitating*. I will go to the next step, *Read On* to see if there is a clue there.** [Read the words after *agitating*.] **After *agitating* it says, 'and not calming.' I see the word *not* remember I told you that some antonym clues have the word *not*. The sentence *not calming,* so this means that agitating means not calming. Hmmm… so if it not calming that means it is bothering or it's something you don't like. So using the antonym clue not calming. I think agitating means that something bothers you. Let go to the next step to 'check the picture.' I am going to see if there are some clues in the picture that show that some music is agitating or not calming. [**Model checking the picture.**] I don't see anything that shows that music is not calming, but that's okay because I know that sometimes pictures don't always help. I am going to go the last step, 'ask, does this make sense.' From the antonym clue I think agitating means bothering. I am going to reread the sentence to see if I say bothering instead of agitating and see if the sentence makes sense.** [Read the sentence with bothering instead of agitating.] **I have heard music I don't like and it bothers me and music that was calming that I did like. So I think yes, it makes sense that *agitating* means bothering.**

Collaborative Use of the Strategy

- Invite students to try to find other red stoplight words, rate their knowledge of the words, and to look for an antonym clue that uses *not*, collaboratively with you. Say, **"I have shown you how to pause when you find new words, to check your brain to think about whether it is a red or green stoplight word, and how to use antonym clues that the author gave you to help you figure out the meaning of the word. Sometimes antonyms are easy to find because the author gives you another clue by using the word, *not,* to tell you the new word means the opposite. We will practice pausing to check our brains, and looking for antonym clues. When I say a word that you do not think that you know the meaning of, I want you to hold your hand out to pause have me pause and we will use PROPS together to figure out if we have noticed a new word and to figure out what the new word means."**
- Display the collaborative practice sentence 1: If you are a kid, play a <u>small</u> guitar, not a **bulky** guitar.
- Review each step of PROPS allowing students to help identify the word *bulky* as unfamiliar and to find the clue word *not* to show that there is an antonym clue that tells the reader something is different or being contrasted. Be sure to model the language of using each step and to clearly state that *bulky* means large or too big. Have students to use this language as well.
- Display the practice sentence 2: When you play the guitar be sure you press down <u>hard</u> on the strings, not **lightly**.
- Review each step of PROPS allowing students to help identify the word *lightly* as unfamiliar and to find the clue word *not* to show that there is an antonym clue that

tells the reader something is different or being contrasted. Be sure to model the language of using each step and to clearly state that *lightly* means softly. Have students to use this language as well.

Guided Practice

- Have children work individually or in pairs. Provide children with the copy of the passages and stoplights to color. Review the steps for PROPS and provide coaching to all children in identifying the new/target word, rating their knowledge of the new/target word and underlining the antonym clue and using the explicit language to express how they figured out the meaning of the new/target word. For example, children should say that the word *not* helped them to use the antonym clue *shaking*, to figure out that *stable* means the opposite of *shaking*. Provide support for children with one of the two passages. See a copy of the Word-Investigating with Antonym Clues Guided Practice Sheet 4.1 at the end of the lesson.

Independent Practice

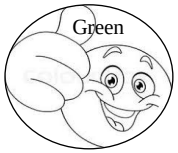
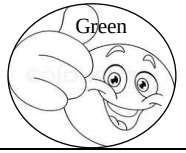
- Provide students with the Word-Investigating with Antonym Clues Activity Sheet 4.1. Working with a partner the students should read the sentences and use PROPS to find unfamiliar words and the antonym clues to ascertain the meaning of the unfamiliar words. As students are working in pairs, provide coaching **as needed** to each student in using PROPS and provide explicit feedback on their use of the strategy.
- When all or most pairings are done, use a white board or document camera, to display the sentences. Have a volunteer identify the unfamiliar word and the antonym clues to tell the meaning of the new/target word and to describe how he or she figured out the word's meaning.

Closing

Thank students for working hard at pausing to find new words, checking their brains to think about what the new words mean, and finding antonym clues to help them figure out the meaning of the new word. Remind students of what PROPS stands for and when and why to use it. Tell students that in the next lesson they will continue to practice finding new words, using the stoplight to check their brains, and using antonym clues, which mean the opposite to figure out the meaning of red stoplight words.

Name: _____

Word-Investigating with Antonym Clues Guided Practice Sheet 4.1

	Be sure that the guitar is stable and not shaking in your hands.	_____ (new word)  	I think stable means _____ _____ _____.
	Keep your back straight and not hunched over the guitar.	_____ (new word)  	I think hunched means _____ _____ _____.

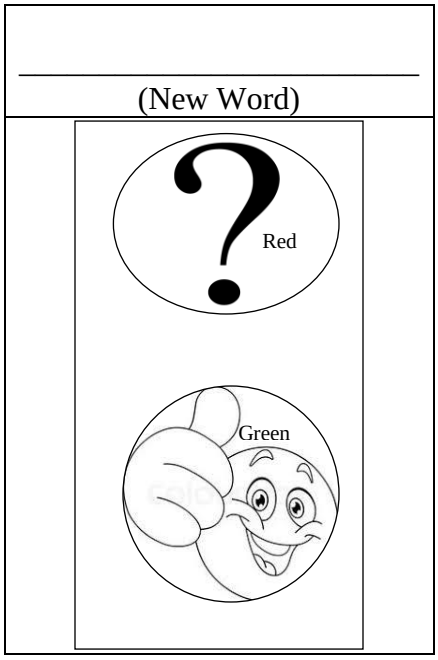
Names: _____

Word-Investigating with Antonym Clues Independent Practice Sheet 4.1

Instructions:
Read the sentence. Use PROPS and the stoplight to help you and your partner find the new word. Underline the new word. Write the new word above the stoplight. Circle the antonym clue. Write what you and your partner think the new word means in your own words.

PAUSE and check your brain.
REREAD
Read **O**N
Check the **P**ICTURE
Does your guess make **S**ENSE?

Learning to play the guitar is ambitious and not easy.



Did you underline the word ambitious? What do you think the word ambitious means?

_____

_____

Appendix 2.C

List of Sound and Music Books Used as References

Labrecque, E. (2013). *How did that get to my house? Music*. Ann Arbor, MI: Cherry Lake Publishing.

Levine, S. & Johnstone, L. (2000). *The science of sound and music.* New York, NY: Sterling.

Pinkney, A. D. (2015). *Rhythm ride: A road trip through the Motown sound.* New York, NY: Roaring Book Press.

Morse, E. (2017). *What is hip hop?* New York, NY: Akashic Books.

Taylor-Butler, C. (2009). *Sound: Super cool science experiments*. Ann Arbor, MI: Cherry Lake Publishing.

Walker, S. M. (2011). *Investigating sound.* Minneapolis, MN: Lerner Publishing Group.

Appendix 2.D
Unfamiliar Target Word List

Table 2.4 Unfamiliar Target Word List

Lesson 1	AoA mean rating	**Lesson 5**	AoA mean rating	**Lesson 9**	AoA mean rating	**Lesson 13**	AoA mean rating
transporting	10.38	boost	7.89	absorb	8.83	store (storage)	7.56
jumbled	7.74	sound waves	NA	soundproof	11.2	hasty	10.28
Lesson 2		megaphone	10.20	cacophony	17.00	confident	9.58
eagerly	8.5	amplifier	11.35	dissonance	12.82	composed	9.16
clamorous	11.63	amplitude	12.44	harmony	8.79	brief	8.44
delicate	8.20	rupture	11.05	choir	6.53	persist	9.5
attend	7.72	buffer	12.37	orchestra	9.44	hinder	11.10
muffle	9.84	**Lesson 6**		tremolo	13.00	**Lesson 14**	
drone	10.11	consistent	10.00	**Lesson 10**		patriotic	8.39
throb	10.05	patter	9.18	occasion	8.16	accompany	10.75
Lesson 3		range	7.11	emotions	6.37	melody	6.58
clatter	8.74	unpleasant	9.32	turntable	10.39	classification	11.11
murmur	11.22	soothe	8.40	genre	12.75	produce	7.75
jabber	9.67	**Lesson 7**		Blues	NA	plectrum	NA
wheeze	8.61	various	9.58	weary	9.56	a cappella	NA
raspy	10.89	distinct	10.5	bass	8.63	improvising	9.68
dull	8.05	pinna	NA	**Lesson 11**		**Lesson 15**	
Lesson 4		cochlea	15.14	monitor	9.68	professional	9.06
tone	7.67	ear canal	NA	agitating	10.17	extraordinary	9.32
pitch	6.42	inaudible	12.84	bulky	10.47	pseudonym	13.26
trachea	12.05	frequency	9.79	lightly	NA	modify	9.39
larynx	12.72	transmit	9.78	stable	8.9	mature	9.25
petite	9.42	**Lesson 8**		hunched	8.68	encore	10.84
vocal folds	NA	devices	8.06	ambitious	11.05	noteworthy	9.94
lengthier	6.05	urgent	8.68	**Lesson 12**		museum	8.55
constricted	9.75	ultrasounds	12.15	shriek	8.94		
		infrasounds	NA	delicate	8.21		
		navigation	10.20	limited	7.38		
		converse	12.00	complicated	8.39		
		hazard	7.61	briskly	10.17		
		vermin	10.84	vaguely	9.84		

Conclusion

This dissertation is inspired by my research interest in developing young children's vocabulary through texts and speech. I have chosen to focus on young children's skill in ascertaining unfamiliar word meanings from context given that most word meanings are learned incidentally through oral and written contexts (e.g., Penno, Wilkinson, & Moore, 2002; Sternberg, 1987). Additionally, language and reading standards require that primary-grade students demonstrate skill in determining unknown word meanings within grade-level content (NGA & CCSSO, 2010). However, there is minimal research on young children's development of this skill.

There is a wealth of research on how to explicitly teach young children word meanings (e.g., Biemiller & Boote, 2006; Marulis & Neuman, 2010). Although research shows that directly teaching word meanings is effective, in isolation it is not an efficient method for young children to acquire the large number of words they need to learn to be able to comprehend academic texts as they progress in their schooling and it does not appear to support general comprehension development (Nagy & Anderson, 1984; Wright & Cervetti, 2017). Unfortunately, there is minimal research on vocabulary instruction for young children beyond explicitly teaching word meanings. There is a need for more research on how young children acquire word knowledge as they read and hear spoken language and how to support that acquisition.

Given the importance of vocabulary to children's literacy development and the need for research on word-learning strategies, I have developed two assessments that measure aspects of

young children's skill in using word-learning strategies and developed an intervention to examine the effects of teaching young children to use multiple word-learning strategies. The first assessment, the MIA, was developed in a study that preceded this dissertation (Wise & Duke, 2019). It is designed to measure first- and second-grade students' skill in ascertaining unfamiliar word meanings from context using four types of context clues (antonym, definition, picture, and synonym). The second assessment, the Noticing Unfamiliar Words Assessment (NUWA), measures second graders' skill in noticing unfamiliar words. This assessment was developed under the theory that noticing unfamiliar words may be a metalinguistic skill that provides children with more opportunities to infer word meanings from context. The first paper of this dissertation reports on the development and psychometric qualities of this assessment. These two assessments were used in the second study of this dissertation, an experimental study, which measured the effects of an intervention that I developed that taught second graders to use multiple word-learning strategies to ascertain word meanings from context. Combined, these studies add to the dearth of research on young children's skill in using word-learning strategies. In the following sections, I discuss the previous study on the development of the MIA and the contributions, implications, and future directions for research on assessments and instruction concerned with young children's skill in using word-learning strategies.

The Development of the MIA (Pre-Dissertation Study)

I began my study of young children's skill in ascertaining word meanings from context by first investigating how to assess this skill. The development of the MIA was informed by research with older students that has demonstrated that teaching students to use context clues to infer word meanings from context is effective (e.g., Fukkink & de Glopper, 1998) and the validation of a classification system for the types of context clues found in narrative and

informational texts written for children between the ages of 4 – 8 (Parault Dowds, Rogers Haverback, & Parkinson, 2016). I also considered the primary-grade standards that require first- and second-grade students to use sentential context to determine unknown word meanings (NGA & CCSSO, 2010). The study of the MIA reports test design and development procedures to demonstrate the fairness, reliability, and validity for using the assessment with first- and second-grade students from a range of socioeconomic backgrounds. The sample included 142 first- and second-grade students.

The study also reports the analytical steps used to select items for the final version of the assessment and includes the results of the Confirmatory Factor Analysis used to examine the factor structure of the assessment. A 15-item assessment that included four types of items (antonym, definition, picture, and synonym clue items) that represented narrative and informational texts had a mean inter-item correlation of .18, which suggests the assessment has adequate reliability based on Briggs and Cheek's (1986) recommended range of 0.15 - 0.50 for mean inter-item correlations. This internal consistency reliability estimate indicates that the items are not redundant or unrelated. The study provides evidence that the four types of items (antonym, definition, picture, and synonym clues) can be used to measure generally and specifically (subtests of each clue type) first- and second-grade students' skill in ascertaining word meanings from sentential and pictorial context. The purpose of developing this assessment was to provide a valid and reliable measure of young children's skill in ascertaining word meanings from context for educational research and classroom application. The MIA is administered one-on-one and takes about 10 minutes. In classroom settings, educators can use the MIA to monitor first- and second-grade students' development of skill in ascertaining words meanings from sentential and pictorial context using the four types of context clues with relative

ease, as it does not require an extensive amount of time to administer. Each item contains an open-ended response and a multiple-choice response. The different response types also allow educators to monitor and interpret the skill level of children of varying language skills. The multiple-choice items are easy to score, and the open-ended responses are scored using a rubric that is user-friendly in that it contains descriptions and examples of possible answers for each item. Additionally, this assessment can be used in vocabulary research to better understand the role that skill in using context clues as a word-learning strategy plays in first- and second-grade students' vocabulary development as well as their comprehension skills. This assessment can also be used to examine the effectiveness of instruction aimed at improving young children's skill in one key word-learning strategy: ascertaining word meanings from context. However, as researchers have noted, it is likely that skill in flexibly using multiple word-learning strategies has a more positive effect on children's comprehension skills than skill in using a single strategy (Wright & Cervetti, 2017). To be able to apply word-learning strategies, listeners and readers would need to notice that an unfamiliar word is present. Researchers have described noticing unfamiliar words as an enabling strategy as it gives students the opportunity to make an attempt in ascertaining the meaning of an unfamiliar word from context (e.g., Cai & Lee, 2010). However, to date it is not clear whether and how skill in noticing unfamiliar words influences not only skill in ascertaining word meanings from context, but more generally vocabulary development and comprehension. Therefore, I developed an assessment to measure young children's skill in noticing unfamiliar words to help unearth this skill's relationship to these aspects of young children's literacy development.

Contributions of Paper 1 of Dissertation

Paper 1 of this dissertation is a report of the development and the psychometric testing of the Noticing Unfamiliar Words Assessment (NUWA). In this study, I conceptualize noticing unfamiliar words as a metalinguistic skill that enables ascertaining the meaning of unfamiliar words from context. There is minimal research on young children's skill in noticing unfamiliar words. However, other metalinguistic skills, such as ambiguity detection or word familiarity judgment, have been found to be related to the development of vocabulary knowledge and comprehension skills (e.g., Kamowski-Shakibai & Cairns, 2016; Merriman, Lipko, & Evey, 2008). The purpose of developing the NUWA was to create a valid and reliable assessment that measures second graders' skill in noticing unfamiliar words that can be used to better understand how instruction impacts the development of this skill.

Similar to the study on MIA, I report test-design and development procedures to demonstrate the fairness, reliability, and validity of using the assessment with second-grade students. The sample included 55 students from a range of socioeconomic backgrounds, which de Winter, Dodou, and Wieringa (2009) suggest is an adequate number. To measure second graders' skill in noticing unfamiliar words, I developed three-sentence informational passages. Some items contained a pseudo-word as the unfamiliar target word, and other items did not. I report the validity procedures, such as the expert review and piloting I used prior to administering the assessment to the study's sample. I also report the analytical steps used to select items for the final version of the measure and results of the exploratory factor analysis used to examine whether the assessment measured a single factor as was hypothesized. The final version of the assessment is a 15-item assessment that includes two types of items: 12 items that contained a pseudo-word as the unfamiliar target word and three items that did not contain an

unfamiliar target word. The mean inter-item correlation and Cronbach's alpha were calculated to estimate the internal consistency reliability. The assessment has a .31 inter-item correlation, which is within the range that Briggs and Cheek (1986) recommend. The Cronbach's alpha estimate was .84. Both of these estimates suggest that the assessment has adequate internal consistency reliability.

This study of the development and psychometric testing of the NUWA provides evidence that second graders' skill in noticing unfamiliar words is a construct that can be measured using pseudo-words as unfamiliar target words embedded in short informational passages of texts. Such an assessment is needed to test the hypothesis that skill in noticing unfamiliar words is an enabling strategy for ascertaining word meanings from context and to better understand the role of skill in noticing unfamiliar words in young children's vocabulary development and comprehension skills.

The development of the NUWA contributes to the needed research on the development of children's skill in using word-learning strategies and whether and how to develop this skill and the implications it may have for young children's vocabulary development and comprehension skills. The assessment is relatively easy to administer and score. It is administered individually. The test administrator reads all directions and items to students. It takes about 7 – 8 minutes to administer. Only the items that contain a pseudo-word item are scored. Responses that name the pseudo-word or are a close attempt at pronouncing the pseudo-word are credited one point.

Together, these two assessments are contributions to early vocabulary research in several ways. First, they document methods for developing valid and reliable vocabulary assessments focused on skill in word-learning strategies for primary-grade students. Second, they provide a means to better understand how metalinguistic skill in noticing unfamiliar words and integrating

semantic information, such as context clues, are related to ascertaining word meanings from context. Third, these assessments can be used to better understand the trajectory of the development of word-learning strategies, the relationships among the strategies, and how the strategies are related to vocabulary development and comprehension skills. Fourth, these assessments can be used to examine instruction aimed at developing primary-grade students' skill in using these particular word-learning strategies. The second study of this dissertation demonstrates this fourth contribution of the two word-learning strategy assessments.

Contributions of Paper 2 of Dissertation

In the second study, I developed a word-learning strategies intervention for second graders. Using a randomized controlled trial design, I examined the effects of the 15-lesson intervention on developing second graders' skill in noticing unfamiliar words and their skill in ascertaining word meanings from context using four specific types of context clues. The NUWA and the MIA were used as measures in this study. The study included 78 second-grade students attending high-poverty schools. Children were randomly assigned to either participate in the invention or to continue with business-as-usual instruction. Results indicated that students who participated in the intervention outperformed those who did not in noticing unfamiliar words within context. However, there was no statistically significant difference between the intervention group and the control group in ascertaining unfamiliar word meanings from context.

Although this study was underpowered with only 78 students (the power analysis for a minimum detectable effect size of .27 called for at least 110 students), the findings suggest that second graders' skill in using word-learning strategies, specifically noticing unfamiliar words and ascertaining word meanings from context, can be developed through instruction. We also

find evidence that the two assessments can be used to examine the effects of word-learning strategy instruction.

Implications and Future Directions

My research on primary-grade students' skill in using word-learning strategies suggests that it is worthwhile to continue to investigate children's skill in both noticing unfamiliar words and skill in ascertaining word meaning from context as they both are skills that seem to be developing during this stage of their literacy development and can be further developed through explicit instruction. In the assessment development studies as well as the intervention study, we can see that children vary in their skill in noticing unfamiliar words within context and in their skill in ascertaining word meanings from context. In paper 1, the students' scores on the NUWA ranged from 0 to 11 on a 12-point scale and in the intervention study, the students' scores on the NUWA ranged from 0 to 12 on that same scale. In the pre-dissertation study on the MIA, the students' scores ranged from 1 to 48 on a 60-point scale and in the intervention study, the students' scores on the MIA at pretest, ranged from 0 to 46. Given that some children demonstrate greater skill than others, if these skills prove to be important to vocabulary acquisition and or comprehension skill development, it would be important to better understand how word-learning strategy instruction can influence the development of these skills, particularly in children who score relatively low on the assessments. This research has especially salient implications for the vocabulary instruction offered to children attending high-poverty schools because vocabulary scores in those schools are on average, lower than in other school settings (e.g., Biemiller & Slonim, 2001). These studies indicate that second graders who attend high-poverty schools may benefit from instruction aimed at teaching children to use multiple word-

learning strategies, particularly noticing unfamiliar words and ascertaining word meanings from context.

Future research should further investigate the construct validity of the assessments. For example, it would be important to better understand how the MIA is related to general inferencing skills. Furthermore, when administering the two assessments separately during the posttest period of the intervention study, I noticed that some children were identifying the unfamiliar target word before I finished reading the assessment item. It may be that a measure that simultaneously examines children's skill in noticing unfamiliar words and ascertaining word meanings from context may be a more naturalistic and efficient way to assess these skills. Future research should explore the possibility of a hybrid measure of both skill in noticing unfamiliar words and skill in ascertaining word meanings from context. It would be important to account for children's working memory capacity to better understand their skill in noticing unfamiliar words within context. Future research on the development and design of the NUWA should examine second graders' working memory capacity in relation to their performance on the assessment.

The statistically significant difference between the intervention and the control groups' skill in noticing unfamiliar words at posttest indicates that it is possible to positively influence this skill with second graders. With 7.5 hours of instruction in multiple word-learning strategies, second graders were able to gain skill in noticing unfamiliar words. This is a relatively short period of time to develop a skill that may give children considerably more opportunities to learn new word meanings while engaged in listening activities. However, 7.5 hours, at least as implemented in this study, was not enough time to develop children's skill in using four different types of context clues to ascertain word meanings from context. With the MIA and the NUWA, or possibly refined versions of these assessments, future research could reveal whether a longer

and/or differently designed intervention is effective for developing second graders' skill in ascertaining unfamiliar word meanings from context. Furthermore, future research should examine the effects of this intervention on second graders' vocabulary development and comprehension skills.

Overall, the studies within this dissertation make a contribution to vocabulary research in that they add to the dearth of research on the development of and instructional practices for improving young children's skill in applying word-learning strategies while listening to texts. Combined with the existing research on explicitly teaching word meanings to young children, we are moving towards better understanding how to provide primary-grade students with multi-faceted vocabulary instruction.

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