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THE EFFECTS OF THREE SERVICE DELIVERY MODELS ON VOCABULARY LEARNING BY SECOND-GRADE CHILDREN

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THE EFFECTS OF THREE SERVICE DELIVERY MODELS ON VOCABULARY LEARNING BY SECOND-GRADE CHILDREN

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Health Sciences
at the University of Kentucky

By

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ABSTRACT OF DISSERTATION

THE EFFECTS OF THREE SERVICE DELIVERY MODELS ON VOCABULARY LEARNING BY SECOND-GRADE CHILDREN

Speech-Language Pathologists (SLPs) provide services to children in schools across the United States primarily in a direct small group service delivery model outside of the regular education classroom. To date little research exists to indicate that direct pull-out service delivery is an effective model in elementary schools for students requiring speech and language therapy. One area that has been studied is the effectiveness of vocabulary intervention among service delivery models. Preliminary findings suggest that students with language and literacy deficits learn vocabulary well within a regular education environment with SLP support. However, there is little consensus on how service delivery models are defined in the literature and what constitutes effective vocabulary instruction in different models. Previous studies comparing service delivery models that target vocabulary were aimed at curricular vocabulary. There are no studies addressing service delivery models targeting instructional verbs and intensity of instruction.

The present study aimed to determine if co-teaching, the process by which two professionals cooperatively plan and teach a lesson, produced differential effects on children's vocabulary learning as compared to more traditional service delivery practices. To achieve this, a 3 x 3 x 2 randomized experimental design was used to answer the study questions. The independent between group variables were three different service delivery conditions by three student groups. The three service delivery conditions included 1) co-teaching between an SLP and a classroom teacher, 2) traditional SLP pullout, and 3) traditional second grade teacher. The three student groups included typical students and two groups of students at risk for literacy deficits, students identified as low socio-economic status and students with disabilities. The within group dependent variables were the group aggregate scores at pre-test and post-test on two different vocabulary measures used to assess the effects of the three service delivery conditions. Finally, we examined differences in vocabulary instruction among the three service delivery conditions with a focus on dosage, frequency, and intensity of the instruction.

Participants included six classroom teachers within three schools in a moderately sized school district in a suburban Kentucky county, three SLPs and 112 second grade

student participants. Nine instructional verbs were taught over the course of six weeks with two 20-minute sessions per week in all service delivery conditions.

Results indicated that all students' vocabulary knowledge increased significantly regardless of service delivery model. Instruction had significantly greater effects on all students' expressive word knowledge than receptive word knowledge. However, group differences did emerge. Students identified as typical and low SES groups scored significantly better on the expressive measure than students in the disability group. Students identified in the typical group scored significantly better on the receptive measure than the students in the low SES and disability groups. While no meaningful differences in student learning emerged across delivery models, the teaching episode intensity was higher in conditions involving an SLP as compared to the teacher only condition. Implications for provision of vocabulary instruction using instructional verbs are discussed.

KEYWORDS: Service Delivery Models, Intensity, Vocabulary Intervention, Instructional Verbs, Low SES, Disabilities

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5/6/2020

Date

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DEDICATION

In loving memory of my Mother, who was always an example of quiet strength in the face of adversity. To my husband of 25 years, Jeff Stone, and my children, Abby, Ally, and Aidan who grew up while I worked on this degree. To my extended family, and my Faith Baptist Church family who have supported me and loved us. Finally, to my public-school district who supported this study.

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In addition to the technical and instrumental assistance above, I received equally important assistance from family and friends. My husband, Jeffery Stone provided on-going support throughout the dissertation process, as well as technical assistance critical for completing the project in a timely manner. Finally, I wish to thank the school district and respondents of my study (who remain anonymous for confidentiality purposes).

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CHAPTER 1. SCHOOL BASED SPEECH LANGUAGE PATHOLOGISTS

1.1 Introduction

Speech-language pathologists (SLPs) in the United States have been providing services to students with speech and language disabilities in public schools in small group therapy sessions outside of the classrooms in half-hour periods since the early 1900s (Duchan, 2010; McDonald, 1915). In the most recent Schools Survey Report, the American Speech-Language-Hearing Association (ASHA) reported that SLPs continue to spend much of their time each week, approximately 18 – 20 hours, in pullout services to students with communication needs (ASHA, 2018). Furthermore, SLPs in the elementary school setting provide pullout services in a small group of 2-4 students regardless of the severity of or the disorder being treated (Brandel & Loeb, 2012; Mullen & Schooling, 2010). Traditional SLP pullout therapy services have maintained their definition in the literature as therapy services for small groups of students in sessions of 21-30 minutes in length outside of the regular education classroom environment (Brandel & Frome Loeb, 2011; Cirrin et al., 2010; Mullen & Schooling, 2010).

In the 21st century, national policies including the Individuals with Disabilities Education Act, (IDEA, 2004), and ASHA, (2010) promote the use of collaboration across school environments for serving students with disabilities, including students with speech and language needs, in their least restrictive environments (LREs). ASHA has long held the view that SLPs must work in partnership with other professionals such as classroom teachers, paraprofessionals, other SLPs, physical and occupational therapists in schools to meet students' needs and support the instructional program (ASHA, 2010). Despite national policies regarding collaboration in schools, approximately 75% of the SLPs

service provision time continues to be spent serving students with speech and language impairments in traditional pullout therapy services model (Brandel & Frome Loeb, 2011; Cirrin et al., 2010). Furthermore, the research regarding efficacy and effectiveness for the variety of populations of students SLPs serve in the schools is lacking for both the traditional pullout service delivery model and the collaborative models (Brandel & Frome Loeb, 2011; Cirrin et al., 2010; Mount, 2014a).

The concept of a service delivery model has been defined in the literature as an organized configuration of resources aimed at achieving a particular educational goal (Cirrin et al., 2010). Service delivery models answer the questions of where services are delivered, who delivers the services, and how frequently services are delivered (Brandel & Frome Loeb, 2011; Cirrin et al., 2010). Alternative classroom-based service delivery models, where the SLPs provide services to students within the regular or special education classroom environment, co-teaching or team teaching with classroom teachers have been described as more inclusive service delivery models (Boyle, McCartney, Forbes, & O'Hare, 2007; Brandel & Frome Loeb, 2011; Cirrin et al., 2010; Throneburg, Calvert, Sturm, Paramboukas, & Paul, 2000). Despite the descriptive literature surrounding a variety of service delivery models, there is very little evidence school based SLPs can use regarding which service delivery models to use and when to use them (Cirrin et al., 2010).

One area surrounding the use of alternative service delivery models that has received attention in the literature is provision of services for students with and without disabilities using vocabulary as the learning target (Cirrin et al., 2010; Elksnin & Capilouto, 1994; Throneburg et al., 2000). Public school systems in the United States

have recently been inundated with a multitude of issues surrounding literacy skills of students including the reading comprehension scores on the 2017 National Assessment of Education Progress (NAEP, 2019). Two of the five key components in literacy instruction for young children are vocabulary and reading comprehension (NICHHD, 2000; Shanahan, 2005). Vocabulary knowledge has been well documented as the most persistently identified and strongest variable related to reading comprehension and academic achievement (Baumann, 2009; Coyne, McCoach, & Kapp, 2007; Freebody & Anderson, 1981).

The National Reading Panel (NRP, 2000) reported on vocabulary instruction and reading comprehension for students at all levels in school and highlighted the importance of teaching vocabulary as part of reading instruction. However, when looking at the trends in education over the past 30 years, little to no progress has been made in regard to reading comprehension or how vocabulary is taught in schools, particularly with students before the third grade (Catts, Hogan, & Adlof, 2005; Cuticelli, Coyne, Ware, Oldham, & Loftus Rattan, 2015; U.S. Department of Education, 2019).

1.2 Problem Statement

Students from low socio-economic (SES) households begin school as early as age three already behind their peers in vocabulary knowledge (Biemiller, 2001; Hart & Risley, 2003). By the time children from low SES households enter elementary school the vocabulary knowledge gap is well established and persists through their elementary school career (Biemiller, 2001; Hart & Risley, 2003). Rich vocabulary instruction has been shown to be effective when teaching all students, however very little direct vocabulary instruction happens in schools, particularly before the third grade (Beck,

McKeown, & Kucan, 2013; Biemiller, 2001). SLPs serving public school children have specific guidance and training on how to teach vocabulary, but little time to provide these services school-wide (ASHA, 2001; Beck & McKeown, 2007; Stahl, 2016).

Using alternative service delivery models such as co-teaching with regular education teachers in schools may be one approach SLPs can use to resolve this problem. However, there is very little evidence in the literature that supports the effectiveness of collaborative services for student learning outcomes and which types of collaborative services SLPs should employ in the classroom environments (Brandel & Frome-Loeb, 2011; Cirrin et al., 2010; Mount, 2014; Throneburg, et al., 2000). Furthermore, many SLPs report a lack of success in effectively collaborating with other professionals in the school environment (Fallon, 2008; Kent-Walsh, Stark, & Binger, 2008). High caseloads, workload size, administrative support, and the Individualized Education Program (IEP) team may influence an SLP's recommendations for collaborative services (Brandel & Frome Loeb, 2011). Other barriers to provision of collaborative services documented in the literature include scheduling and planning time for both teachers and SLPs, resistance from other professionals, along with the workload/caseload size issues (Brandel & Frome Loeb, 2011; Elksnin & Capilouto, 1994; Pershey & Rapking, 2003; Pfeiffer, Pavelko, Hahs-Vaughn, & Dudding, 2019).

1.3 Purpose of the Study

The purpose of this study was to determine if the co-teaching method, the process by which two professionals jointly plan and teach a lesson, produced differential effects on children's vocabulary learning as compared to traditional service delivery practices employed by SLPs and classroom teachers. The primary investigator (PI) also examined

the extent to which the service delivery methods including co-teaching, traditional SLP, and traditional classroom instruction produced differential effects on vocabulary learning of three groups of students, including two at risk groups (low SES and students with disabilities). Finally, the PI explored the intensity of the vocabulary instruction that occurred in the three conditions that might explain student gains in vocabulary learning. The PI sought to answer the following questions,

Question 1: What are the main effects of three service delivery models a) co-teaching, b) SLP pullout, and c) teacher on vocabulary learning of instructional verbs by 2nd grade students?

Question 2: What are the main effects of the three service delivery models a) co-teaching, b) SLP pullout, and c) teacher on vocabulary learning of instructional verbs by children identified at risk for literacy deficits (i.e. students from low SES households and students with disabilities) compared to typical students?

Question 3: How does cumulative intervention intensity affect vocabulary outcomes among the three service delivery models a) co-teaching, b) SLP pullout, and c) teacher)?

1.4 Definition of Key Terms

Below are the key terms, defined for the purpose of this study, to provide definition and clarity to the reader. The terms for alternative service delivery models, dose, and intensity are included.

Co-Teaching – The process by which two professionals (usually a special educator and a regular education teacher) cooperatively plan and teach a lesson together to students in a

classroom. In the present study the condition where an SLP and classroom teacher jointly plan and teach.

Collaboration – To work jointly with others or together, especially in an intellectual endeavor.

Cumulative Intervention Intensity – The distribution of cumulative teaching episodes over the duration of one session measured in episodes per minute.

Disability – Any one of 14 categorical labels set forth by the Individuals with Disabilities Education Act (2004) which will require a student to have an Individual Education Program with accommodations and/or modifications for learning to succeed in a classroom environment.

Dose Form – The typical task or activity within which the teaching episodes are delivered.

Dose Frequency – The number of times a dose of intervention is provided per day/week, (i.e. one time per day for 2 days each week).

Fidelity – The degree of exactness with which the vocabulary lesson is taught based on the parameters given for the program.

IDEA – Individual with Disabilities Education Act is the law that makes available a free and appropriate public education (FAPE) to eligible children with disabilities in the United States and ensures special education and related services to those children (IDEA, 2004).

Individualized Education Program (IEP) – An individualized educational program, identifying how students should be educated is put in place for each student between the ages of 3-21 with an identified disability in schools.

Instructional Vocabulary – School specific vocabulary used for instructional purposes and may be provided to students verbally or in written contexts.

Intervention Duration – The time period over which a specified intervention is presented (i.e. six weeks).

Service Delivery Conditions – A variety of methods used to deliver specially designed services in schools by SLPs, teachers, interventionists and other related services either working together in teams or individually.

SES – Socio-economic status as defined by state regulations for free and reduced lunch status.

SLP-Pullout services – Students are pulled out of the classroom by the SLP in small groups, usually of 2-4 students, to receive instruction for speech and language skills.

Teacher – A single teacher for a classroom of students, in this case the teacher for each classroom of 2nd grade students.

Teaching Episode – The words and their accompanying definitions used together one time during an intervention session.

1.5 Summary

Chapter one introduced the difficulty SLPs have when using the evidence base for choosing alternative service delivery models. There are a variety of service delivery models SLP can choose from, but not much research regarding which is most effective, when to use them, or with which students specific models are effective. However, there is some evidence regarding the use of collaborative service delivery models when teaching curricular vocabulary.

The review of the literature in chapter two will explore the variety of service delivery options that have been documented in the literature and specific problems that have been identified regarding service delivery models. The lack of information about the effectiveness of SLP services within different service delivery models specifically for vocabulary learning will be explored. Problems with preparatory education for both SLPs and classroom teachers regarding collaborative teaching practices will be investigated and how these practices are implemented in classrooms will be addressed. Finally, we will investigate the issue of how students learn vocabulary as opposed to how classroom teachers and SLPs may teach vocabulary in schools. Chapter three details of the methods of the study, including the setting and participants, research design, and the procedures for selection of stimuli, testing, and the intervention provided. In chapter four the findings are presented for all research questions. Chapter five completes the study by discussing findings, implications, and recommendations for further research.

CHAPTER 2. LITERATURE REVIEW

2.1 Service Delivery Models

Service delivery models for school based SLPs have had some focus in the literature over the past few decades. School-based SLPs historically have provided therapy services for students with speech and language impairments individually or in small groups outside of the regular education classroom (Brandel & Frome Loeb, 2011; Cirrin et al., 2010; Duchan, 2010; Mullen & Schooling, 2010). However, federal legislation has changed the way students in the United States are educated and has brought students with special education needs (SENs) including speech and language impairments into regular education classrooms (Nochajski, 2001; Suleman, McFarlane, Pollock, Schneider, Leroy, & Skoczylas, 2014). The Individuals with Disabilities Education Act (IDEA) provided legislation for educating all students in their Least Restrictive Environment (LRE) (IDEA, 2004). The literature has described this period in education history as the inclusion movement (ASHA, 1996; Throneburg et al., 2000; Will, 1986). Because of this inclusion movement in the United States (ASHA, 1996), there is a growing body of literature supporting collaborative services by SLPs for students within their regular education classroom particularly for teaching vocabulary (Cirrin, et al., 2010; Elksnin & Capilouto, 1994; Throneburg, et al., 2000).

The American Speech-Language-Hearing Association (ASHA) reports that despite this, SLPs in schools continue to provide direct pullout therapy services, which occur outside of the regular education classroom for most students, particularly at the elementary school level (ASHA, 2016; Brandel & Loeb, 2012; Mullen & Schooling, 2010). A variety of service delivery models have been described in the special education

literature (Friend, 2008; Friend, Cook, Hurley-Chamberlain, & Shamberger, 2010), however, service delivery model choice by SLPs who provide services to students in schools has received less attention and may be problematic due to caseload and workload demands (Brandel & Frome Loeb, 2011; Cirrin et al., 2010; Mullen & Schooling, 2010).

2.2 Service Delivery Terminology

The literature provides a variety of terminology regarding collaborative services between classroom teachers and special educators, which include school based SLPs. Collaboration is defined as "to work jointly with others or together, especially in an intellectual endeavor" (Meriam-Webster, 2017). Collaboration in regard to school based SLPs is defined by ASHA as SLPs working in partnership with others in the school environment including administrators, teachers, specialists, paraprofessionals, and other related services to meet students' needs in the classroom (ASHA, 2010). A variety of collaborative teaching models have been defined in the regular and special education literature, as well as in the speech and language literature (Blosser & Kratcoski, 1997). Each model described has different labels and there has been little consensus regarding the definitions. In many cases, what the specific roles are of the service providers within each of the working models are also not well defined (Blosser & Kratcoski, 1997; Friend, 2015; Suleman et al., 2014).

For SLPs, service delivery models are described as transdisciplinary, interdisciplinary, consultative, and multidisciplinary, ranging from most to least integrative, with integration defined as how much communication and shared responsibility there is between collaborators (Hall & Weaver, 2001; Hartas, 2004; Suleman et al., 2014). Classroom teachers and other professionals, including school-

based SLPs, describe the most integrative collaborative teaching services as “co-teaching”, “team teaching”, and “parallel teaching” where two professionals share the responsibility for teaching the entire class together, or in two equal groups while leading the same lesson (Elksnin, 1997; Elksnin & Capilouto, 1994; Flynn, 2010; Friend, 2008; Friend et al., 2010).

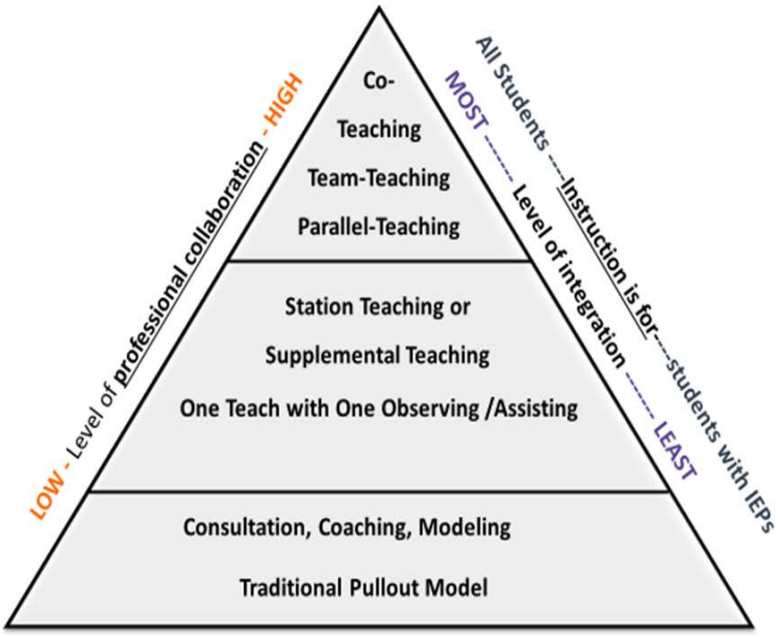
Moderately integrative models are described in the literature as station teaching, supplemental teaching, and remedial teaching, where two professionals teach smaller groups at a time, and where both professionals may teach the same content, but in alternate ways with varied materials (Elksnin & Capilouto, 1994; Flynn, 2010; Friend, 2008; Friend et al., 2010). Other less integrative models include one teach/one drift or assist, where a primary teacher and another professional assists individual students in the classroom as required, or one teach/one observe where one teacher maintains primary teaching responsibilities while another professional observes interactions within the classroom environment (Elksnin & Capilouto, 1994; Flynn, 2010; Friend, 2008; Friend et al., 2010; Suleman et al., 2014). The one teach/one assist model and one teach/one observe model are reported as the most used service delivery models by SLPs providing classroom-based therapy (Throneburg et al., 2000).

Consultation is minimally integrative and is a model where there is a referral system in place, and experts are available to comment on or make recommendations about a student (Hartas, 2004; Pershey & Rapking, 2003; Suleman et al., 2014). In schools, consultation may take place with or without the presence of students, and frequently occurs outside of the classroom environment (Pershey & Rapking, 2003). Consultation takes various forms including the expert modeling a task with a student with

return demonstration by the other professional; coaching a teacher or paraprofessional about certain strategies; input on uses of scaffolding with students, fading support, where the expert withdraws support as the teacher becomes confident in using a strategy with a student (Hartas, 2004; Suleman et al., 2014). The non-integrative, multidisciplinary model is the traditional pullout model used by many special education teachers and other related service providers such as occupational therapists and physical therapists, as well as SLPs (Suleman et al., 2014).

Traditional pullout therapy for school based SLPs has been defined as services in an individual or small group setting, outside of the regular education classroom for 21-30 minutes, 1-2 times per week (ASHA, 2010; Brandel & Loeb, 2012; Cirrin et al., 2010; Mullen & Schooling, 2010). This type of traditional approach was also described in the early history of speech services in public schools and has been utilized by SLPs since 1910 (Duchan, 2010). Figure 2.1 shows the range of service delivery models that SLPs typically use in schools from most integrative at the top of the pyramid to least integrative at the bottom (Friend, 2008). Therefore, it is not about 'pushing-in' to the classroom or pulling students out of the classroom, but rather using a variety of service delivery options based on student need.

Figure 2.1, SLP Classroom Integration Pyramid



2.3 Preparatory Education for Provision of Service Delivery Methods

Speech-language pathologists in the United States must hold a master's degree with a minimum of 36 semester credit hours at the graduate level that includes academic course work and supervised clinical experience sufficient in depth and breadth to achieve the specified knowledge and skills outcomes (ASHA, 2018). When SLPs receive collaborative service training within their graduate school practica, they are six times more likely to provide shared teaching experiences within the classroom (Brandel & Frome Loeb, 2011). The University of Alberta in Canada has developed Interprofessional Education Experiences (IPEs) between departments of Elementary Education and Speech Pathology and Audiology for their students to work and learn together (Suleman et al., 2014). Students in both colleges who completed the IPE experience described service delivery beyond the general idea of collaboration, and the SLP students aligned with a more integrative approach to service delivery (Suleman et al., 2014). However, collaborative therapy within the larger classroom may have disadvantages as well and pullout therapy settings may provide more opportunities for targeting specific language needs and faster remediation of skills (Ehren, 2000; Elksnin & Capilouto, 1994).

One reason SLPs report a lack of success in effective collaboration may be poor preparation for collaboration in their graduate training programs. In a survey conducted with 1,897 SLPs across the United States it was found that less than 25% of the SLPs reported having experienced classroom-based intervention at the elementary level during their graduate school training (Brandel & Frome Loeb, 2011). Furthermore, SLPs and pre-professional teachers reported limited knowledge of collaborative practices and had a limited shared understanding across disciplines (Wilson, McNeill, & Gillon, 2015). Even

when experience with classroom based interventions occur at the graduate preparation level, SLPs are more likely to provide collaborative intervention in a resource room with a special education teacher rather than in a regular education classroom, or in the small group speech therapy room (Brandel & Frome Loeb, 2011; Pfeiffer, Pavelko, Ingram, & Pearson, 2018).

Recently, the Council on Academic Accreditation in Audiology and Speech Language Pathology required graduate programs to prepare preprofessional students to interact and coordinate care effectively with other disciplines, which would include classroom teachers for SLPs in school settings (ASHA, 2017; Pfeiffer et al., 2018). However, if only 25% of SLPs in the elementary schools currently provide collaborative services, this may mean that very few pre-service SLP students are being trained to provide collaborative services in the classroom with classroom teachers in their school-based rotations.

SLPs in the United States are well prepared for providing small group or individual pullout therapy services. Approximately 90% of all SLPs administered individual or small group intervention outside of the classroom during their graduate school training (Brandel & Frome Loeb, 2011). It was not until they were in the field and sought professional development, either in the workplace or through professional development programs, that they began to explore other service delivery models (Brandel & Frome Loeb, 2011; Silliman, Ford, Beasman, & Evans, 1999; Suleman et al., 2014). There continues to be very little understanding of how various service delivery components, including the setting and collaboration, may serve as active ingredients of speech-language therapy for children with language impairments (Schmitt, 2015). Very

few studies have investigated the components of service delivery to examine the variations in treatment effects on language skills in school aged children (Schmitt, 2015). The studies that have addressed service delivery models have done so specifically with vocabulary skills or phonemic awareness skills in the classroom (Elksnin & Capilouto, 1994; Throneburg et al., 2000; Ukrainetz, Ross, & Harm, 2009; Wilcox, Kouri, & Caswell, 1991).

2.4 Vocabulary Teaching and Learning in Schools

The literature supports vocabulary knowledge as the most persistently identified and strongest variable related to reading comprehension (Baumann, 2009; Coyne et al., 2007; Freebody & Anderson, 1981). However, students identified from low (SES) households begin school as early as age three already behind their peers in vocabulary development (Biemiller, 2001; Hart & Risley, 2003). Children entering elementary school with smaller vocabularies are at risk for experiencing reading and learning difficulties and need more intentional teacher directed vocabulary instruction (Biemiller, 2001; Coyne et al., 2007). Unfortunately it is important to note that elementary classrooms continue to have very limited instruction on word knowledge, and schools in general are not doing much to increase student vocabulary (Beck & McKeown, 2007; Biemiller, 2001; Biemiller & Boote, 2006; Loftus-Rattan, Mitchell, & Coyne, 2016). Most vocabulary instruction in the elementary classroom is teacher directed, definitional, and involves shared story book reading usually within the English-Language Arts published curriculum (Ashworth & Pullen, 2015; August, Artzi, & Barr, 2016; Baker et al., 2015). Examinations of vocabulary instruction in elementary school classrooms have revealed little change in the classroom practice of teaching vocabulary (Blachowicz,

Fisher, Ogle, & Watts-Taffe, 2006). Many teachers continue to allow minimal time for explicit vocabulary instruction even with the inception of Common Core State Standards (CCSS) (Beach, Sanchez, Flynn, & O'Connor, 2015).

Research has informed consumers about what good vocabulary instruction should be, however, what happens in individual classrooms may not incorporate this (Blachowicz et al., 2006). Individual teachers may be successful in using a variety of strategies for vocabulary instruction however what is needed is a comprehensive, integrated, schoolwide approach to vocabulary in reading and learning (Blachowicz et al., 2006). Vocabulary instruction for students at different ages and stages has been described in the literature and researchers have appealed for more teacher directed vocabulary instruction, especially in the primary grades (Biemiller, 2001; Coyne, et al., 2010).

Many students learn vocabulary incidentally through story book reading and research suggests that when students are provided with extended opportunities to interact with target words in varied contexts beyond those from the original story, word learning is enhanced (Beck & McKeown, 2007; Biemiller & Boote, 2006; Coyne et al., 2010). Extended vocabulary instruction has been defined in the literature as teacher directed instruction that provides both definitional and contextual information, involves students in active deep processing of words, reviews words in various contexts and involves student discussions of word meanings (August et al., 2016). While extended vocabulary instruction has been found to be very effective for elementary students, it has also been found to be very effective for English Language Learners (ELLs) with both academic words and domain specific vocabulary (August et al., 2016).

Several instructional vocabulary programs have been proposed in the literature. Two such programs are the Robust Vocabulary Instruction Program (Beck, McKeown, & Kucan, 2013), and the Project Early Vocabulary Instruction and Intervention (Project EVI) which provide guidance for SLPs and teachers looking to improve the quality of vocabulary instruction in their classrooms (Baker, et al., 2015; Beach, et al., 2015; Coyne, et al., 2010). Both of these programs suggest that explicit vocabulary instruction in the classroom consist of different activities across the school day and include examples/non-examples, picture support, making connections to background knowledge and to words already known, and multiple opportunities for review. These programs also support student discussion, word games, and writing opportunities which can improve students understanding of word meaning and contextual use (Beach, et al., 2015; Beck, et al., 2013; Coyne, et al., 2010). While it is important to note that there is no single mode of instruction that is uniformly effective for all students, vocabulary instruction requires a repertoire of teaching activities and instructional strategies which when coupled with the teacher's ability to choose appropriate words within this repertoire may be very effective (Blachowicz et al., 2006).

2.5 Service Delivery Model Effectiveness with Vocabulary Learning

The American Speech-Language-Hearing Association (ASHA) conducts a school based SLP survey every two years to gather information about professional issues related to school-based services and reports on the trends over time. These reports typically address service delivery model use by school based SLPs across the United States. The types of service delivery models reported on include collaborative consultation, direct classroom-based/integrated services, and direct pullout services. According to ASHA,

more of the SLP's time (18-20 hours per week) was spent in direct pullout services to students compared to 4-7 hours per week in classroom based integrated services (ASHA, 2018). According to the 2018 trend analysis the average number of hours per week that school based SLPs spend in classroom based integrative services is on the rise. What the report does not tell us is how classroom based integrated services are defined by SLPs or how SLPs are using these services in practice. Furthermore, collaborative consultative services have remained level over the past several years (ASHA, 2018). There is some evidence for different service delivery model use with vocabulary instruction in schools with children but are limited to collaboration (in class services with or without the teacher) and small group pullout services.

2.5.1 Collaborative Service Delivery Model.

The purpose of providing services in a collaborative in class model is to help students develop the skills needed to interact with the curriculum and participate in classroom instruction (Pershey & Rapking, 2003). Even though ASHA (2018) is reporting a rise in classroom based integrative services by SLPs in schools, the literature reports that in many cases SLP services delivered as direct in-class collaboration remain primarily independent of the teacher with no true collaboration occurring between the teacher and the SLP (Elksnin & Capilouto, 1994; Throneburg et al., 2000). In reviewing collaborative SLP services across all grade levels, pre-school through high school, SLP service delivery characteristics of place, frequency, and length, remain similar (Brandel & Frome Loeb, 2011; Mullen & Schooling, 2010). Students in the preschool setting tended to receive a wider variety of treatment models and were much more likely to receive treatment in a classroom setting either integrated or self-contained, than were

students in the K – 12 population (Mullen & Schooling, 2010). The National Outcomes Measurement System (NOMS) developed in the 1990s was designed to capture information about functional outcomes by SLPs in the school setting (Mullen & Schooling, 2010). The school-based portion of the NOMs rated 14,852 students by 597 SLPs in 106 school systems across the United States. It reported that approximately 39% of preschool children received classroom based services and another 7% of children received collaborative consultation services by SLPs (Mullen & Schooling, 2010). Regardless of where treatment occurred, the frequency of treatment and length of treatment remained the same as a traditional approach of twice per week for 21-30 minutes in length across all grade levels pre-school through high school (Mullen & Schooling, 2010).

In the study conducted by Throneburg et al. (2000), 177 children in two different elementary schools were included in kindergarten through third grades. They provided specific instruction using curricular vocabulary in a collaborative setting where the SLP and the K-3 teachers along with two students in a Communication Disorders and Sciences program collaborated to plan intervention and activities. They also provided a classroom-based program to teach curricular vocabular in K-3 classrooms where the teacher and the SLP worked independently. The SLP provided intervention in the classroom without collaboration with the classroom teacher meaning no planning with the classroom teacher was involved and the teacher was not present in the classroom during the lessons given by the SLP. The third condition in their investigation was the traditional SLP pullout setting where curricular vocabulary was taught. The control group consisted of children within the regular education setting who were exposed to the

curricular vocabulary but who did not receive any services from the SLP. They found that the collaborative model was more effect for teaching curricular vocabulary to students who qualified for speech or language services than a classroom-based model where the SLP and classroom teacher worked independently and the traditional SLP pullout model. Their second finding was that SLPs have an impact on the vocabulary growth of all students in the classrooms when using a collaborative or classroom-based service delivery model (Throneburg et al., 2000). In the studies conducted by Valdez and Montgomery (1997), Farber and Klein (1999), Ellis et al., (1995) and Wilcox et al. (1991) the findings support that collaborative service delivery improved language skills of the classes as a whole more than the traditional curriculum presented by teachers. The studies by Valdez and Montgomery (1997) and Wilcox et al. (1991) reported that collaborative classroom-based services and pullout treatment by SLPs were equally effective with pre-school aged children who needed speech-language services (Throneburg et al., 2000).

Regardless of place or frequency of treatment, there is minimal empirical evidence available regarding the efficacy of service delivery models used by SLPs on the outcomes of students with speech-language impairments in schools in the United States (Brandel & Frome Loeb, 2011; Cirrin et al., 2010; Mullen & Schooling, 2010). One area where effectiveness has been reported is with vocabulary skills. In the systematic review conducted by Cirrin, et al., (2010), *Cohen's d* was used to report effect sizes where an effect size of $\geq$ 0.8 is considered to be large, 0.5 is a medium effect size, and $\leq$ 0.2 is a small effect size (Cirrin et al., 2010; Cohen, 1988). It was reported that when teaching curricular vocabulary, the effect sizes for children who received collaborative services in

the classroom was (d = 1.65) compared to children who received classroom-based services by SLPs without collaboration (i.e. SLP and classroom teacher working independently of each other), but a smaller positive effect size of (d = 0.3) when compared with pullout services (Cirrin et al., 2010; Throneburg et al., 2000). Therefore, there is evidence by Throneburg et al. (2000) as reported in the systematic review that collaborative services provided by SLPs in the classroom may be somewhat more effective for teaching curricular vocabulary than the traditional pullout approach and much more effective than SLPs providing classroom based intervention without collaboration with the classroom teacher (Cirrin et al., 2010). This research also indicated that for children, at least in preschool and elementary school, intervention in the classroom setting facilitated generalization of vocabulary skills within the more natural classroom setting (Cirrin et al., 2010; Farber & Klein, 1999; Wilcox et al., 1991).

There is support in the literature for children with moderate language impairments making greater gains with direct classroom based collaborative services than children with mild language impairments, however, children with greater language needs may need a combination of service delivery models including individual therapy sessions or collaboration with parents (Brandel & Frome Loeb, 2011; Cirrin et al., 2010; Elksnin & Capilouto, 1994; Farber & Klein, 1999). Overall, there is guarded optimism about the efficacy of integrated or co-teaching services in schools between SLPs and classroom teachers because of the limited research (Cirrin et al., 2010; Farber & Klein, 1999; Wilcox et al., 1991). Furthermore, there is no consensus by researchers that co-teaching is effective in all grade levels or for all students with specific speech-language needs,

because more research is needed (Cirrin et al., 2010; Elksnin & Capilouto, 1994; Farber & Klein, 1999).

In the speech and language literature, despite the difficulties understanding the efficacy of practices, collaboration between SLPs and classroom teachers has been supported and promoted (Blosser & Kratcoski, 1997; Brandel & Frome Loeb, 2011; Nippold, 2012). They report that the use of collaborative services by SLPs within the regular classroom environment is imperative, not only because of the links between language competence, curriculum content, social and vocational success, but also in convincing classroom teachers of the value of SLPs within the schools they serve (Ehren, 2000, 2015; Nippold, 2012). Collaboration between SLPs and teachers is described as crucial to effective service delivery because of the SLPs expanded roles in the areas of literacy, curriculum and response to intervention (RtI) (Suleman et al., 2014).

There is also support for collaboration between regular classroom teachers and SLPs in the education literature. A qualitative study conducted by Reblin (1994) indicated that both students with language learning disabilities and regular education teachers felt frustration with the traditional pull-out service delivery model, and students felt single out when pulled out of class for services. However, when a collaborative service delivery model was used by SLPs with the language impaired students it was found that classroom teacher gained skills and knowledge to work with these students within the classroom environment (Reblin, 1994). In a study conducted by Barnes (1999) regarding classroom teachers with positive experiences collaborating with an SLP and special education teacher, reported that it was an essential part of establishing a community of learning and building respect for every school community member.

School administration support for collaboration at the district and school levels in inclusive classrooms has also been documented. The shift toward more collaborative classrooms has placed new and different demands on school administration (Rea & Connell, 2005). Administrators' supervision and evaluation of the co-teachers is essential to the success of the teachers and the students in the classroom (Rea & Connell, 2005). However, it has been noted that there is inconsistency in administrators' knowledge and practice regarding co-teaching in the classrooms and that professional development for school administration is warranted (Kamens, Susko, & Elliott, 2013). School district support, through training for collaborative services, has been shown to improve buy-in for co-teaching by school personnel, instructional practices in the classroom, and student performance at all grade levels (Kamens et al., 2013; Rea & Connell, 2005; Ullman, 2010). Therefore, district and school administration should not 'mandate' collaborative practices, but encourage buy-in by classroom teachers and SLPs so they can build effective co-teaching services through professional development practices (Barnes, 1999; Lindeman & Magiera, 2014).

2.5.2 Traditional SLP Pullout Service Delivery Model.

According to ASHA's 2018 school based SLP survey, more of the SLP's time was spent in pullout, small group service of students than any other activity and the time spent in this model was the highest in elementary schools. This has been the trend according to ASHA's reports from 2000-2018 and historically since the early 1900s (Duchan, 2010). Furthermore, ASHA's National Outcome Measures report for SLPs working in the public school system at all grade levels in the United States indicated that SLPs see 90% of students with speech and language needs in pullout services as opposed

to collaborative, in-class services (Mullen & Schooling, 2010). SLPs continue to use small group pullout services for a variety of reasons including caseload/workload issues, administrative and teacher support within the school, and student needs/severity of their disorders (Brandel & Frome Loeb, 2011). Most of the literature regarding service delivery, collaboration, and inclusion speaks at least briefly about the traditional pullout model used by SLPs in that it continues to be the 'norm' for SLPs (ASHA, 2016; Brandel & Loeb, 2012; Cirrin et al., 2010; Mullen & Schooling, 2010).

Much of the information on advocating for the use of a traditional pullout model comes from surveys and opinions of both SLPs and classroom teachers. The idea of using a variety of service delivery models including traditional pullout services to meet the individual needs of the students that the SLPs serve has been re-iterated throughout the literature (Mount, 2014; Nippold, 2012; Suleman et al., 2014). It is clear that SLPs believe that traditional pullout services used to teach specific skills such as articulation, fluency, voice, social skills, etc. are valuable and may offer advantages over co-teaching service delivery models (Nippold, 2012). It was noted this may be because teaching explicit skills may be more beneficial in a smaller environment (Meyers, Gelzheiser, Yelich, & Gallagher, 1990). Classroom teachers have supported the idea that children with speech, language and learning needs, may need more individualized support for learning curricular content than what they would typically receive in a classroom, therefore advocated for pullout services (McWilliam & Bailey, 1994; Meyers et al., 1990). Currently classroom teachers and SLPs alike agree that collaborative services, although ideal, are not always possible due to high workload and caseload demands,

therefore the traditional pullout services continue to be the most used model (Brandel & Frome Loeb, 2011; Glover, 2015).

There is also some evidence that shows support for traditional pullout services from school personnel and administration. Much of the literature currently written promotes collaboration and bringing SLPs into the regular classroom (Dodge, 2004; Elksnin, 1997; Elksnin & Capilouto, 1994; Flynn, 2010; Pershey & Rapking, 2003; Ritzman, Sanger, & Coufal, 2006). The articles that support traditional pullout services by SLPs are older, but continue to hold relevance (McWilliam & Bailey, 1994; Meyers et al., 1990). Other articles, although not specifically supportive of the traditional pullout model, agree that it is the current state of service delivery for SLPs (Brandel & Loeb, 2012; Cirrin et al., 2010; Mullen & Schooling, 2010). In a study by Ritzman and Sanger (2007), it was reported that principals viewed SLPs as knowledgeable and valued members of the multidisciplinary team, which has been show to be the least integrative, across all levels of education. However, it was also noted that the principals in this study were frequently unclear as to the SLPs role, particularly regarding providing services to children and adolescents (Ritzman & Sanger, 2007). The results indicated that there was a need for the SLPs in schools to continue to have discussions with school administration and advocate for SLPs services that are provided (Ritzman & Sanger, 2007).

CHAPTER 3. METHODS AND PROCEDURES

3.1 Design

The present study aimed to determine if co-teaching, the process by which two professionals cooperatively plan and teach a lesson, produced differential effects on children's vocabulary learning as compared to more traditional service delivery practices. To achieve this, a 3 x 2 randomized experimental design was used to answer the study questions. The independent between group variables under question were the three different service delivery methods, specifically 1) co-teaching between an SLP and a second-grade teacher, where the SLP and classroom teacher cooperatively planned and delivered the vocabulary lesson to a class of second grade students, 2) traditional SLP service delivery method, as defined by ASHA (1991, 2016), where the SLP independently planned vocabulary lessons and pulled small groups of second grade students out of their classroom to deliver the vocabulary lesson, and 3) traditional second grade instruction, where the teacher independently planned and delivered the vocabulary instruction to their class of second grade students. The within group dependent variables were the group aggregate scores at pre-test and post-test on two different vocabulary measures used to assess the effects of the three service delivery methods.

The primary investigator (PI) also examined the extent to which the service delivery methods, including co-teaching, traditional SLP, and traditional classroom instruction, produced differential effects on vocabulary learning of three groups of students. We included a typical group of students, who come to school not at risk for literacy deficits, and two groups of students at risk for literacy deficits; including students from low SES backgrounds and students with disabilities as evidenced by a current active

individualized education program (IEP). To achieve this, the PI used a 3 x 3 x 2 randomized experimental design to compare the effects of the three different service delivery methods on changes in word knowledge from pre-test to post-test among the three distinct groups of students (typical, low SES, and disability) (Creswell, 2018).

Finally, the PI explored the intensity of the vocabulary instruction that occurred in the three conditions that might explain student gains in vocabulary learning. The Primary Investigator (PI) was particularly interested in the cumulative teaching episode intensity of intervention which is the product of dose x dose frequency x total intervention duration (Warren, Fey, & Yoder, 2007). Dose is defined by Warren et al. (2007) as the number of properly administered teaching episodes during a single intervention session. We were interested in determining if differences in teaching episode intensity by session length impacted how well students learned the vocabulary words.

3.2 Methods

3.2.1 Setting

Three elementary schools in a rural central Kentucky region were chosen from a convenience sample of nine elementary schools to participate in this study. The participating elementary schools were chosen because they had at least three second grade classrooms with principals and staff supporting participation in the study. The schools were identified as Title 1 schools and received federal Title 1 funds. The PI secured approval from the Assistant Superintendent of Student Learning and the principals at the schools prior to contacting the teachers and SLPs about the study. Table 3.1 shows participating school demographics.

Table 3.1, Participating School Demographics

School Demographics

School	Total Student Enrollment	Hispanic %	Caucasian %	African American %	Other %	ESE %	FRL%
School A	622	16.9%	80.0%	0.9%	2.2%	17.9%	36.7%
School B	733	12.6%	76.5%	5.87%	5.03%	23.1%	39.7%
School C	482	8.1%	80.4%	10.7%	1.2%	20.3%	65.1%

ESE = Exceptional Student Education (includes Gifted and Talented and Disabilities)

FRL = Free and Reduced Lunch (Includes all students whose families fall below the poverty line)

3.2.2 Participants

The study involved adult and child participants within the three schools. The PI secured university Internal Review Board (IRB) approval and the adult participants signed the consent forms prior to the start of the study. Parental permission forms were sent home with the 2nd-grade students at the beginning of the 2018-2019 school year.

3.2.2.1 Adult Participants

The participating adults (n = 9) were employed by the school district and worked in the participating elementary schools. All adult participants had at least one year of experience teaching and were not in their Kentucky Teacher Internship year or in their Clinical Fellowship Year as an SLP. Three of the participating adults were SLPs (one SLP per participating school) with at least one year of experience working in the participating schools and were familiar with the teaching staff and procedures. The six participating classroom teachers were all experienced and knowledgeable about second grade standards. All teachers and SLPs were Caucasian and female which is the typical demographic for teachers and SLPs in this rural area. Table 3.2 shows adult participants professional experience.

Table 3.2, Participating Teachers and SLPs with Years of Experience

School	**Classroom Teacher**	**Total Experience (years)**	**2nd Grade Experience (years)**
School A	Co-Teacher	14	5
	Traditional Teacher	19	2
	SLP	3	3
School B	Co-Teacher	16	12
	Traditional Teacher	18	15
	SLP	5	5
School C	Co-Teacher	16	9
	Traditional Teacher	20	7
	SLP	2	2

3.2.2.2 Child Participants

Parental permission forms with an explanatory letter were sent home with all English-speaking students. Two weeks later a second copy of the permission form with the same explanatory letter were sent home with all students who did not initially respond. Of the 221 parental permission forms sent home with students, 130 signed forms were returned which represented a return rate of 59%. Inclusion and exclusion criteria (see Table 3.3) were applied to the students with returned permission forms. A total of 112 second grade students within the participating elementary schools were included in the study. Of these students there were 54 males and 58 females with 93% of them being Caucasian, 3% were African American, and 4 % were considered other, which included students who identified as Asian American, Hispanic American, and/or two or more races. Student participants in all schools were English speakers and received classroom instruction only in English. Table 3.4 shows the second-grade demographics for each school.

Table 3.3, Child Participant Inclusion and Exclusion Criteria

Inclusion Criteria	**Exclusion Criteria**
• In 2nd grade	• Not in 2nd grade
• Spoke English	• English Language Learners/ English as Second Language.
• Could complete the testing procedures independently	• Students who could not complete the testing procedures independently due to behavior or intellectual impairments.
• Students remained in the general education classroom for 80% or > of the day including time of vocabulary instruction	• Students who do not receive education in the regular classroom environment or who did not remain in the classroom for vocabulary instruction.

Table 3.4, Second Grade Student Demographics by School

School	Total # of students	Caucasian%	African American %	Hispanic %	Other%	ESE %	FRL%
A	94	77%	0	22%	1%	25.5%	40%
B	101	83%	4%	10%	.9%	24.7%	37.6%
C	82	80%	2%	13%	3%	19%	69.5%

ESE = Exceptional Student Education (Includes Gifted and Talented as well as Disabilities)

FRL = Free and Reduced Lunch

Participating students were identified as being a part of one of three groups, including one group of typical students and two groups at risk for literacy difficulties. The two at risk groups were comprised of students identified as low SES and students with a documented disability. Previous research has shown that students from low SES households and students with disabilities enter school significantly behind their peers in vocabulary knowledge and are at risk for later reading comprehension difficulties (Beck & McKeown, 2007; Biemiller, 2001; Hart & Risley, 1995). Low SES was defined as any student from a family below the state poverty line as documented by the free and reduced lunch form submitted by the family at the beginning of the school year. Students with a documented disability were defined as students with an IEP identifying them as a student with a disability in one of the recognized categories of disability (IDEA, 2004). Therefore, these students all met eligibility requirements in the state based on triangulation of evaluation data including norm-referenced testing information in order to receive an IEP. The typical group of students were identified as not meeting the requirements of low SES or disability. Table 3.5 shows the number of students in each condition defined as being Typical, low SES, or Disability.

Table 3.5, Numbers of Students Included by Condition across Group Identification

Condition	**Typical**	**Low SES**	**Disability**	**Total**
Co-Teach	26	10	6	42
SLP Pullout	21	9	7	37
Teacher	19	7	7	33
Total	66	26	20	112

3.3 Stimuli

The present study focused on the use of instructional verbs. Instructional verbs are verbs used by teachers or textbooks during instruction for the purpose of directing student engagement with academic content and concepts (Lowman, Stone, & Guo, 2018). The PI selected fifteen instructional verbs from the second-grade Kentucky Academic Standards (KAS). These words were cross referenced with Coxhead's Academic Word List (AWL) (Coxhead, 2000). The words were given to six, second-grade teachers in non-participating schools. The non-participating teachers were asked to select the words from the list they felt were important to their students' learning. From that list, the PI chose to include nine instructional vocabulary verbs taken from the teacher ratings. Single child friendly definitions were drafted using the guidelines by Beck, McKeown, and Kucan, (2013).

A single child friendly definition is a brief explanation of a word meaning which provides the beginning of word meaning acquisition (Biemiller & Boote, 2006). The definitions were reviewed by the PI's mentors and were edited by the PI for conciseness. The words and definitions were piloted for clarity with 2nd – 5th grade students not involved with the study. The students were given the words and definitions and then asked to tell what the words meant to them. From this information the PI developed the final definitions for the target words. Table 3.6 is the list of words with their child friendly definitions used in this study.

Table 3.6, Selected Vocabulary Words with Definitions

Vocabulary Word	**Single child friendly definition**
Demonstrate	To show how to do something
Expand	To become bigger
Define	To explain the meaning of a word
Recognize	To know or remember something from experience
Locate	To find something in a particular place
Describe	To tell what something is like
Produce	To make something by machines
Organize	To put things in order
Contrast	To tell how two things are different

3.4 Intervention Conditions

Each participating school had one co-teaching condition, one SLP pullout condition (split into two small groups) and one traditional teacher condition. The classroom teachers were randomly assigned to one of two treatment conditions, co-teach or teacher only. The school SLP participated in two conditions, co-teach and SLP pull-out. The PI was not the SLP in any of the three schools. The co-teaching condition consisted of a classroom teacher and the SLP assigned to that school who jointly planned and carried out all of the vocabulary lessons. All students assigned to the co-teacher's classroom received vocabulary instruction.

The SLP pullout condition consisted of the SLP providing vocabulary instruction to a heterogenous group of seven students in a setting separate from the classroom. The SLP saw two separate groups of students for a total of 14 students. Students from each of the three groups - typical, low SES and disability groups – were randomly assigned to the SLP pullout condition. The SLP in each school was the same for both the co-teaching condition and the SLP pullout condition, therefore the time spent in planning and intervention during the study was more for the SLP than the other teachers.

The traditional teacher condition in each school consisted of one classroom teacher who planned and taught vocabulary to all the students in their classrooms. The traditional classroom teacher did not collaborate or share ideas with the SLP or other classroom teacher about the vocabulary lessons. The amount of time each teacher and SLP spent in the service delivery models is described in Table 3.7. All of the students in the co-teaching condition and in the traditional teacher condition received explicit and systematic vocabulary instruction but only the students with signed consent forms were pre- and post-tested.

Table 3.7, Amount of Time Instructors Spent on Study Intervention Each Week

Instructor	**Time in Planning**	**Time in Instruction**
Co-Teacher	20 minutes each week	40 minute each week
SLP	40 minutes each week	120 minutes each week
Classroom teacher	20 minutes each week	40 minutes each week

3.5 Professional Development

Teachers and the SLP assigned to each school attended a two-hour professional development (PD) activity held at the start of the 2018-2019 school year. The PI used the PD activity to deliver explicit training in the principles of robust vocabulary instruction within the classroom context. The teachers and SLPs were shown examples of activities that could be used in the classroom to engage students in vocabulary learning. The example activities were derived from Beck, McKeown, and Kucan's (2013) book "Bringing Words to Life, 2nd Edition: Robust Vocabulary Instruction", and Coyne, et al., (2010) Project Early Vocabulary Instruction and Intervention (Project EVI). Training in vocabulary instruction was followed by an overview of related services delivery models typically used in the school environment which included collaborative teaching and traditional models of SLP pull-out services. The PD opportunity was the same at each school with the same Power Point presentation and activities provided to each group. At the end of the PD session the classrooms were randomly assigned to one of the intervention conditions.

The instructors received an intervention calendar with the words to be taught according to their service delivery condition (co-teaching, SLP pull-out, or teacher). The

calendars outlined the days they were teaching, and which words with definitions were being taught each day. Words for each of the three conditions were randomized so that no two conditions at any school were teaching the same words on any given day. Along with the calendars, lesson planning forms were given for each week so the instructors could write down the activities they would be using with each set of words on each intervention day. The intervention days were set up to mimic the typical SLP schedule as described by ASHA (2016) of twice per week for 21-30 minutes. All intervention sessions were set at twice per week for 20 minutes each session for a total of 12 sessions. Table 3.8 reflects the timelines followed at each school from pre-testing to post-testing students which was equal across all schools.

Table 3.8, Study Timelines for All Schools

School	Pre-Testing	Week 2	Intervention	Post-testing
A	Week 1 (2 days)	Break	Week 3-8	Week 9 – 2 days
B	Week 1 (2 days)	Break	Week 3-8	Week 9 – 2 days
C	Week 1 (2 days)	Break	Week 3-8	Week 9 – 2 days

3.6 Outcome Measures

3.6.1 Child Measures

Two assessments were developed by the PI to assess the students' word knowledge. Expressive and receptive vocabulary measures were utilized to determine how well the students learned vocabulary over the course of intervention. The Expressive Vocabulary Measure (EVM) asks the question "What does (target word) mean" for each of the nine target words. Producing the definitions of vocabulary words is a particularly rigorous test of vocabulary skill but has been studied as outcome variables in the literature (Eller, Pappas, & Brown, 1988; Justice, Meier, & Walpole, 2005). The EVM is scored using a rubric of 0, 1, or 2 points for each of the nine target words (Curtis, 1987; Eller et al., 1988; Justice et al., 2005). The rubric is a scoring guide where 0 means they were unable to answer or the answer was incorrect, 1 means they were able to give a synonym or use the word correctly in a sentence, and 2 means they were able to give a complete definition of the word. All student responses were written verbatim on the test record and were scored using the rubric with common answers listed for each word. See Appendix A for the full EVM used in this study.

Pilot testing of the EVM was completed to ensure uniformity and reliability for scoring. A group of 14 second-grade students known to the PI, from a non-participating school, participated in the pilot testing. All of the students participating in the pilot testing were assessed individually. Common answers on the EVM for the nine words used in the study were written verbatim and put into a scoring rubric for ease and uniformity of scoring.

The receptive vocabulary measure was adapted from Kearns and Biemiller's (2010) two questions vocabulary assessment. They proposed that the use of two questions about the meaning of words with a 'yes' answer and a 'no' answer tap deeper into the student's knowledge of the word meanings than other forms of vocabulary assessment (Kearns & Biemiller, 2010). This measure can be used effectively with mature words that are more abstract and are difficult to depict. The chance of answering two questions correctly is 0.25 which is the same probability as providing a correct response to an item on a multiple choice picture vocabulary test such as the Peabody Picture Vocabulary Test (PPVT) (Dunn & Dunn, 1997) with four pictured choices (Kearns & Biemiller, 2010).

Because all of our words were instructional verbs and were difficult to depict, it is was appropriate to use a measure that asks questions rather than asking children to point to pictures to know if they understand a word. Two questions asking about the meaning of the instructional verbs on the receptive measure were written by the PI and checked for clarity and accuracy by the PI's mentors. For example, the two questions for the word "produce" were 1) Does a stove produce heat? and 2) Does your desk produce books? There is a clear 'yes' answer for the first question and a clear 'no' answer for the other question. For a student to obtain credit for knowing the word, both questions needed to be

answered correctly with one ‘yes’ and one ‘no’ answer. If one question in the pair was answered incorrectly no credit for knowing the word was given. See Appendix B for the full two question vocabulary measured used in this study.

To check for clarity of the questions and to ensure that all questions could be answered correctly, a pilot test was completed for the two-question measure. This measure was given to the group of 14 second-grade students known to the PI, from a non-participating school and who were not involved in the study. The students were assessed individually to determine if they understood and could answer each question.

3.7 Intervention Intensity

Principals of learning taken from the psychology literature indicate that learning is enhanced when trials of taught items are distributed across sessions rather than massed in close succession (Middleton, Schuchard, & Rawson, 2020; Warren et al., 2007). Treatment intensity is not often reported in the literature but has been shown to be important in learning new skill (Justice, Logan, Jiang, & Schmitt, 2017; Middleton et al., 2020; Warren et al., 2007). Warren et al., (2007) proposed the terms that make up intervention intensity. Dose was defined as the number of properly administered teaching episodes during a single intervention session. Dose frequency was defined as the number of times a dose of intervention is provided per day and per week. Total intervention duration was defined as the time period over which a specified intervention is presented. Finally, cumulative intervention intensity is the product of dose x dose frequency x total intervention duration.

The PI defined dose for this study as the number of times the stimulus word and the accompanying definition were used together by the instructors and children over the

course of one vocabulary intervention session. In some cases, the instructors gave both the words and the definitions. Sometimes the instructors said the words and the children immediately gave the definitions or vice versa, or the children said the words and definitions together for the class to hear. We defined our dose frequency as two weekly 20-minute sessions or 40 minutes per week, but we did not control for the number of times the words and definitions were used during the sessions, therefore this number was variable across sessions. The total intervention duration was defined as the course of our study which was 6 weeks. Our cumulative intervention intensity then was counted as the average number of times the words and definitions were used together in a session x 40 minutes per week x 6 weeks.

The stimuli taught in this study were distributed four times over the course of six weeks in order to maximize learning of novel words. The vocabulary instruction in each classroom was video recorded. Videos were collected from all the vocabulary sessions in each of the participating classrooms and were used to determine time spent in intervention, the words used each day, and overall treatment intensity.

3.8 Fidelity

Undergraduate students from the university in the Communication Sciences and Disorders Program were included as trained research assistants (RAs). The RAs were provided specific training by the PI to collect data from each participating classroom during vocabulary instruction. They were instructed to video record the sessions at each school and to verify 1) instruction that was planned, 2) that the words and single student friendly definitions were introduced in each session and how many times they were used by the instructors and students, 3) that the intervention was between 15-20 minutes in

length, 4) that all children were engaged in the intervention through a variety of activities, and 5) that the adult participants taught the correct words on the correct days per the calendar given to them. They kept their data on the fidelity checklist forms created by the PI for this study.

Fidelity interrater percentages were calculated using Cohen's Kappa in SPSS vs 26 to eliminate the chance effect. Cohen's Kappa is utilized when the number of raters is equal to two or more, which means that some of the agreements observed may be due to chance (Martin-Andrés & Alvarez-Hernández, 2020). The scores obtained from the checklist completed by the trained personnel during the vocabulary instruction and the PI who independently watched the videos were calculated for each question on the checklist. There were two observers for each video with agreement between 85 – 100% with an average interrater agreement of 97%, which indicates that there was agreement for occurrence and non-occurrence. There was one episode of disagreement between the raters when one rater indicated that the correct words were taught, however they were actually not. This was corrected for in the study, however the raters had one disagreement which brought the percentage of agreement down. The average percentage of occurrence for each item on the fidelity check was between 94 and 98%. Table 3.9 shows the Kappa values for each question on the Fidelity checklist.

Table 3.9, Interrater Reliability on Fidelity Checklist

Checklist question	**% of occurrence**	**% Kappa value**	**Sig.**
1. Did planning for each session occur?	98%	1.000 = 100%	p = .000
2. Were words used with their correct definitions?	98%	1.000 = 100%	p = .000
3. Was intervention length 15-20 minutes?	94%	1.000 = 100%	p = .000
4. Were activities used to engage all students?	97%	1.000 = 100%	p = .000
5. Were the correct words used on the correct days?	98%	0.854 = 85%	p = .000
6. Was overall fidelity 80% or better?	98%	1.000 = 100%	p = .000

3.9 Procedures

The initial step in obtaining district participation in this study was to approach the District Assistant Superintendent in charge of Student Learning. The PI provided study specific details and ensured that the outcomes of the study would be shared at the completion of the data analysis. A letter of support was given to the PI by the Assistant Superintendent. Once the district letter of support was obtained, letters of support were obtained from principals at the three elementary schools after the study specific details were shared with them. Once the principals gave support for the study, the SLPs at each school were approached individually and were provided study specific details. If any SLP did not want to participate, the process was repeated with the administration at a different elementary school. All the SLPs approached were agreeable to the study. Once the principals and SLPs at each school agreed to host the study, classroom teachers were approached individually and were given study specific details. Initial recruitment time spent with the classroom teachers and SLPs was approximately 30 minutes with time for them to ask questions.

3.9.1 Professional Development

. Instructors attended a 2-hour PD session and were given information about robust vocabulary instruction and service delivery models used in the schools by SLPs. The adult participants were encouraged to ask questions and at the end of the PD sessions the classrooms were randomly assigned to one of the intervention groups by drawing their assignment from a hat.

3.9.2 Pre-Testing

All participating 2nd-grade students were tested individually outside of their classrooms to control for distractions. The expressive vocabulary measure was administered first followed immediately by the receptive vocabulary measure. The total testing time for both measures for each student was estimated at 10-15 minutes. All testing was completed during one three-hour session at each school during the pre-test week, with any absent students being tested another day during the same week. The pre-tests were scored by one RA and the PI to control for scoring reliability. The pre-test occurred a week prior to the beginning of intervention at each school.

3.9.3 Intervention

Six consecutive weeks of vocabulary instruction were completed in all conditions. Intervention sessions consisted of two 20-minute vocabulary lessons and were scheduled to occur on Tuesdays and Thursdays. If any teacher or SLP was absent on one of the scheduled intervention days, the lesson was delivered on the next possible day during that week. Instruction was divided into two three-week blocks. Each set of three words were taught two times in each block. In the first three-week block, the words were initially introduced in two consecutive sessions (see Table 3.10). In the second three-week block, the words were re-randomized and were reviewed again non-consecutively to provide distributed practice which has been shown to improve learning (see Table 3.11) (Warren et al., 2007).

Table 3.10, Words Taught During the First Three Week Block of Intervention

	Day of the Week	**Co-teaching**	**SLP**	**Teacher**
Week 1	Tuesday/ Thursday	Demonstrate Expand Define	Produce Organize Contrast	Recognize Locate Describe
Week 2	Tuesday/ Thursday	Recognize Locate Describe	Demonstrate Expand Define	Produce Organize Contrast
Week 3	Tuesday/ Thursday	Produce Organize Contrast	Recognize Locate Describe	Demonstrate Expand Define

Table 3.11, Words Taught During the Second Three Week Block of Intervention

Week #	Day	Co-teaching	SLP Pullout	Teacher
4	**Tuesday**	Recognize Contrast Describe	Produce Expand Locate	Demonstrate Organize Define
4	**Thursday**	Produce Expand Locate	Demonstrate Organize Define	Recognize Contrast Describe
5	**Tuesday**	Demonstrate Organize Define	Recognize Contrast Describe	Produce Expand Locate
5	**Thursday**	Produce Expand Locate	Demonstrate Organize Define	Recognize Contrast Describe
6	**Tuesday**	Demonstrate Organize Define	Recognize Contrast Describe	Produce Expand Locate
6	**Thursday**	Recognize Contrast Describe	Produce Expand Locate	Demonstrate Organize Define

3.9.4 Post-Testing

Post-testing procedures mirrored pre-testing procedures the week immediately following the final intervention session. The questions on both measures were re-randomized to control for testing effects. The total testing time for all participating students was approximately 10 minutes. The post-tests were scored by one RA and the PI to increase scoring reliability.

3.10 Quantitative Data Analysis

Five pieces of quantitative data were collected and included the vocabulary expressive and receptive pre-tests, vocabulary expressive and receptive post-tests, and the video data from all intervention sessions. Pre-test and post-test scores were de-identified and entered into a spreadsheet with a student number which identified which service delivery condition they were in and their student identification group. Data analysis for vocabulary test scores initially began with Hierarchical Linear Modeling (HLM) (Bryk & Raudenbush, 1992) because students were nested in classrooms and assumptions for using HLM were met. However due to a small N and unequal groups, an alternative option of repeated measures multivariate analyses of variances (RM-MANOVA) was used instead. This allowed the PI to compare the main effects, interactions among all the conditions and student groups, and use the partial Eta squared statistic for effect size.

3.10.1 Video Data Analysis

The video data was organized by service delivery model condition and was used to collect fidelity of instruction data and information about treatment intensity. Dosage is one aspect of vocabulary instruction that is frequently left out of the literature, but it has been shown to be important for word learning (Baumann, 2009; Justice et al., 2005;

Warren et al., 2007). Dose has been defined as the number of properly administered teaching episodes in a single intervention session (Warren et al., 2007). For the purposes of this study dose was defined as the vocabulary word paired with the definition said out loud for the entire group of students to hear. The words and definitions may have been said together by the instructor, or the instructor may have said the word and the students expressed the definitions or vice versa. In some cases, a student would say the word and other students would give the definition out loud for everyone to hear, as long as the word and the definition were said together it was counted as one dose. Cumulative intervention intensity can then be calculated as the dose x dose frequency (2 20-minute sessions per week = 40 minutes per week) x total intervention duration (6 weeks).

CHAPTER 4. RESULTS

The present study examined the effects of vocabulary instruction in three service delivery conditions, co-teaching, SLP pullout, and teacher, on second-grade students' vocabulary learning. The effects of the treatment conditions were explored through quantitative analysis and analysis of video data. Main effects of the treatment conditions on student performance on expressive and receptive vocabulary measures were explored through repeated measures MANOVAs. The follow up video data analysis provided information about cumulative intervention intensity which may shed light on the outcomes of the quantitative data.

This chapter presents the data findings including (a) research questions, (b) summary of overall findings, and (c) cumulative intervention intensity from the video data.

4.1 Research Questions

The major hypothesis in this study was grounded in a theoretical perspective that collaborative teaching plays a larger role in student learning for all students, including those with disabilities, compared to traditional SLP pullout services and classroom teacher only instruction for vocabulary learning (Brandel & Frome Loeb, 2011; Cirrin et al., 2010; Friend et al., 2010; Throneburg et al., 2000). Students in the low SES group were hypothesized to learn vocabulary at the same rate as their typical peers, as low SES status does not impede learning ability. The students may enter school behind their peers in vocabulary exposure (Hart & Risley, 2003), but they have the capacity to learn new vocabulary with explicit instruction (Beck et al., 2013; Biemiller, 2001). Students in the disability group enter school behind their peers in vocabulary development (Biemiller &

Boote, 2006; Loftus, Coyne, McCoach, Zipoli, & Pullen, 2010) and have more difficulty learning new words at the same rate with the same exposure as their peers in the classroom (Adlof, 2019; Kan & Windsor, 2010; Loftus et al., 2010). Collaborative services for students with disabilities pairs a teacher who has content expertise with a specialist, such as an SLP with language expertise which improves the quality of the instruction in the general education classroom by providing learning support strategies (Conderman, 2011; Miller & Oh, 2013). Based on these assumptions, this study was conducted to explore the effects of explicit vocabulary instruction in three treatment conditions: co-teaching, SLP pullout, and teacher only instruction. The exploration and comparison of treatment conditions were guided by the following research questions:

Question 1: What are the main effects of three service delivery models a) co-teaching, b) SLP pullout, and c) teacher on vocabulary learning of instructional verbs by 2nd grade students?

Question 2: What are the main effects of the three service delivery models a) co-teaching, b) SLP pullout, and c) teacher on vocabulary learning of instructional verbs by children identified at risk for literacy deficits (i.e. students from low SES households and students with disabilities) compared to typical students?

Question 3: How does cumulative intervention intensity affect vocabulary outcomes among the three service delivery models a) co-teaching, b) SLP pullout, and c) teacher)?

Teachers were randomly assigned to one of two treatment conditions (co-teaching or teacher). The SLP at each school participated in both the co-teaching and the SLP pullout instruction conditions. The lessons were delivered twice per week for six

consecutive weeks and were identical for time and words. Word sets were randomized to control for order effects. All lessons were planned by the teachers and SLPs prior to implementation each week.

To examine the quantitative effects of service delivery conditions, students in each school were administered a pre-test one week prior to instruction, and a post-test immediately following the last vocabulary intervention session. The pre-test and post-test included the same expressive vocabulary measure worth 18 points total, and the receptive two-question measure worth 9 points total.

The PI initially began analyzing data using Hierarchical Linear Modeling (HLM) (Bryk & Raudenbush, 1992) because students were nested in classrooms and assumptions for using HLM were met. However, HLM was not a reliable type of statistical analysis for this study likely due to a small N and unequal groups.

Alternatively, a series of repeated measures multivariate analyses of variances (RM-MANOVAs) was conducted to determine the interaction among the three service delivery conditions (co-teaching, SLP pullout, and teacher) and the three student groups (typical, low SES, and disability). The assumptions for repeated measures MANOVA were tested for in SPSS v 25 and were met. The assumptions included 1) continuous dependent variables, these were the scores on the pre- and post-tests, 2) two or more categorical independent groups (i.e. co-teach, SLP pullout, teacher), 3) independence of observations – there were different participants in each group, and 4) adequate sample size – more cases in each group than the number of dependent variables.

Multivariate normality of the data was investigated using an analysis of standard residuals. In order to prove that the data contained no outliers we needed the standard

residuals statistic to fall between -3.0 and 3.0 (Field, 2005). The data met this assumption and proved that the data contained no outliers for the expressive measure (Std. Residual Min = -2.88, Std. Residual Max = 2.32) and for the receptive measure (Std. Residual Min = -2.51, Std. Residual Max = 2.24). To address multicollinearity, we looked at the variance inflation factor (VIF). When no factors are correlated, the VIFs will be 1 (Field, 2005). The collinearity test indicated that multicollinearity was not a concern (Expressive Vocabulary scores Tolerance =.996, VIF = 1.00, Receptive Vocabulary scores, Tolerance = .996, VIF = 1.00), therefore this assumption was met.

Finally, the data met the assumption of independent errors. We examined the Durbin-Watson statistic which should always be between a 0 and 4, with a mean value of 2 meaning that there is no autocorrelation in the sample (Field, 2005). The expressive measure Durbin-Watson value equaled 1.761 and the receptive measure Durbin Watson value equaled 1.653. The histogram of standardized residuals (see Figures 4.1 and 4.2) indicated that the data contained approximately normally distributed errors as did the normal P-P plot of standardized residuals which revealed points that were not completely on the line but close. The scatterplots of standardized residuals for expressive post-test and receptive post-test are shown in Figures 4.3 and 4.4.

Figure 4.1, Histogram of Standardized Residuals for Expressive Post-Test Scores

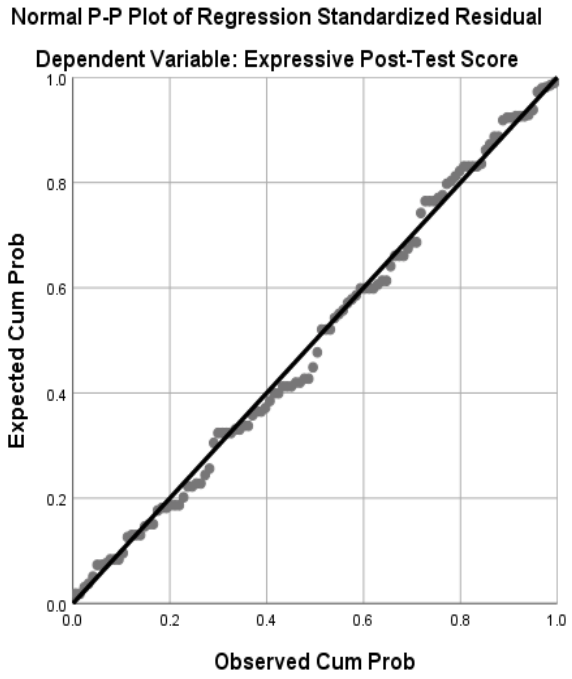


Figure 4.2, Histogram of Standardized Residuals for Receptive Post-Test Scores

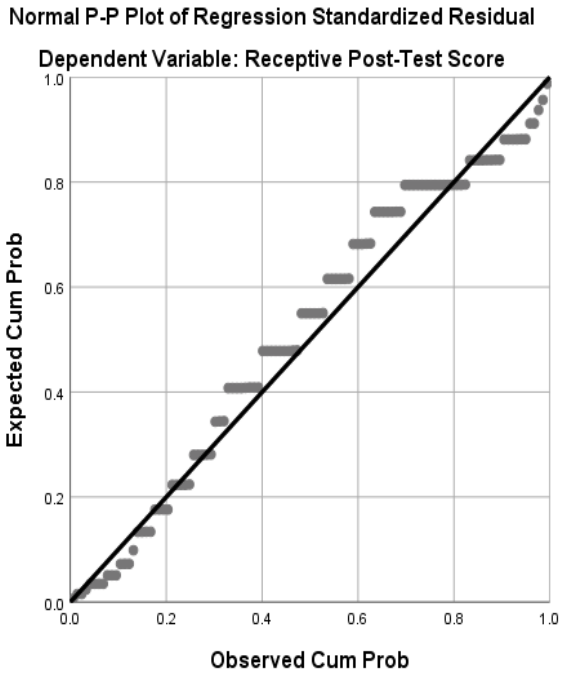


Figure 4.3, Scatterplot of Standardized Residuals for Expressive Post-Test

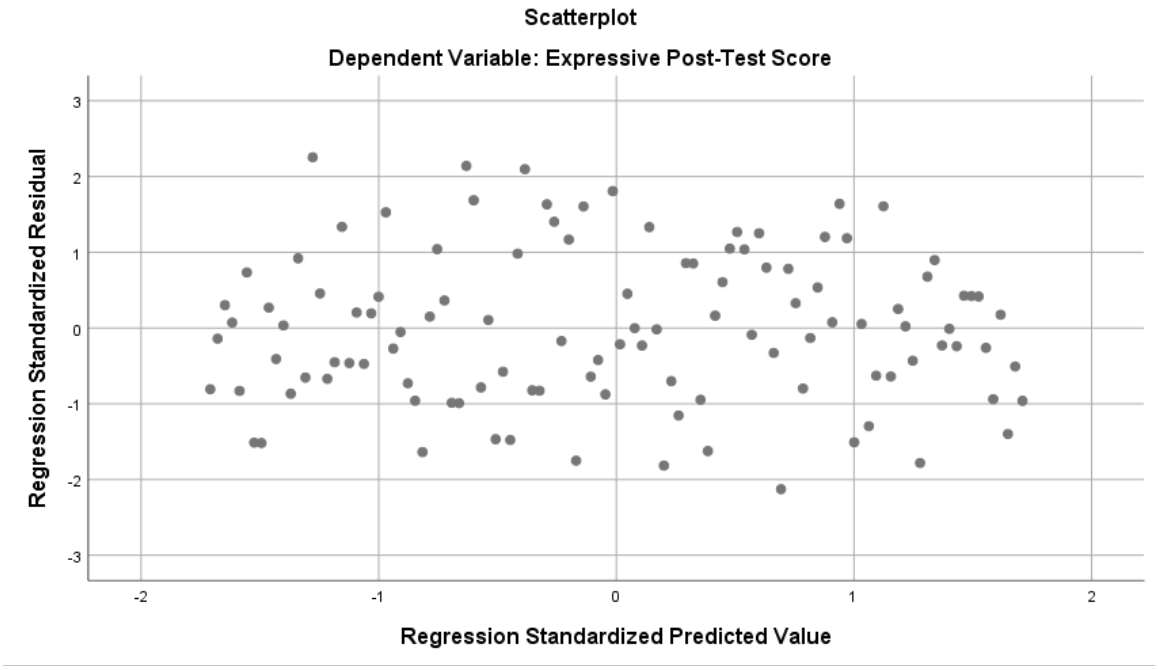
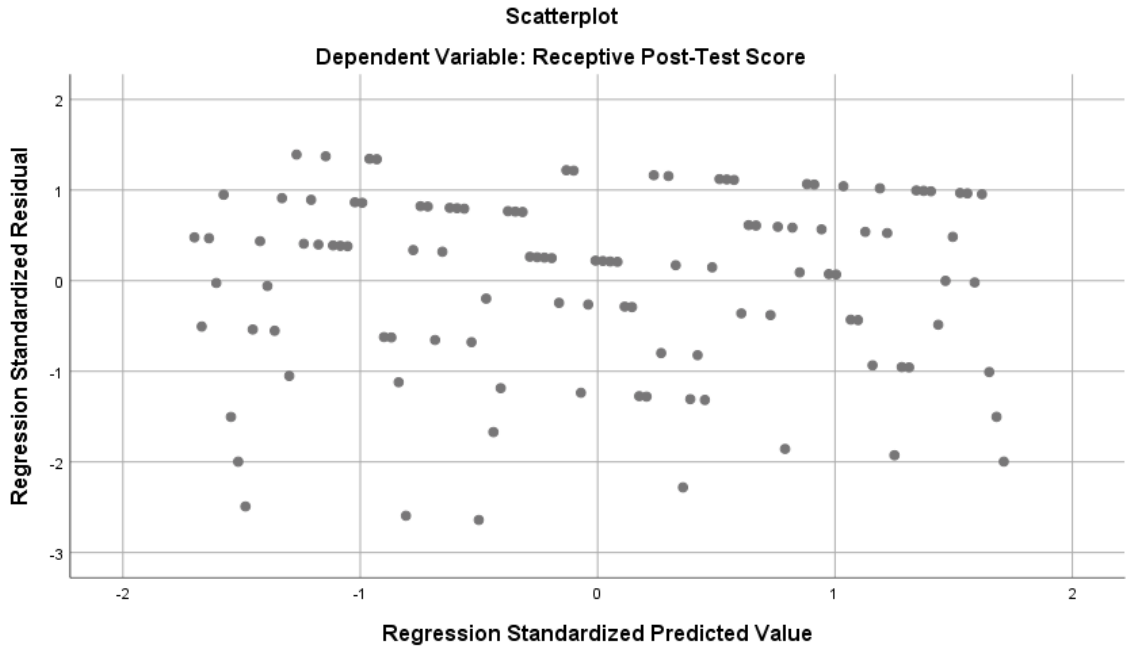


Figure 4.4, Scatterplot of Standardized Residuals for Receptive Post-Test



4.2 Summary of Overall Findings

4.2.1 Question 1: Service Delivery Condition Results

To answer the first research question, a repeated measures MANOVA was completed to determine if significant differences existed within subjects. This was followed by post-hoc multiple comparison analysis using Tukey's Honestly Significant Difference (HSD), which determined where the differences if any occurred. Complete data sets were collected for 112 second grade students who met the inclusion criteria and were present for 80% or more of all the vocabulary lessons. Descriptive statistics for pre- and post-test mean scores and gain scores for the expressive measures are shown in Table 4.1, and in Table 4.2 for the receptive measures. These results are separated by student group 1) typical, 2) low SES, and 3) disability for the three service delivery conditions and also provide the average number of words learned by each group.

There was a non-significant main effect of the service delivery conditions by student group identification on the outcome measures (Wilks $\Lambda = .959$, $F(8, 204) = .540$, $p = .825$, $\eta 2 = .021$). This indicates that there were no significant differences among any of the service delivery conditions for typical, low SES, or students with disabilities on the vocabulary outcome measures. There was a non-significant main effect of service delivery conditions on vocabulary outcomes overall (Wilks $\Lambda = .914$, $F(4, 204) = 2.355$, $p = .055$, $\eta 2 = .044$). Service delivery condition assignment did not affect outcomes on the vocabulary measures.

Table 4.1, Descriptive Statistics for Groups by Condition on Expressive Outcome Measures with Gain Scores and Number of Words Gained

Group	**Condition**	**Pre-Test**		**Post-Test**		**Gain Score**		**Words Gained**
		M	**SD**	**M**	**SD**	**M**	**SD**	
Typical	Co-Teach	4.15	1.62	11.46	3.61	7.31	3.4	3.7
	SLP Pullout	3.19	2.52	9.48	5.38	6.28	4.79	3.1
	Teacher	5.05	2.46	8.16	3.78	3.1	2.66	1.6
Low SES	Co-Teach	3.7	2.16	9.7	2.41	6	2.58	3
	SLP Pullout	2.56	2.13	8.56	6.11	6	4.87	3
	Teacher	4.43	1.51	7.71	3.9	3.28	4.53	1.6
Disability	Co-Teach	1.17	0.75	4.5	3.08	3.33	3.07	1.7
	SLP Pullout	1.86	2.04	7.14	3.63	5.29	2.98	2.6
	Teacher	3.29	2.75	6.43	4.86	3.14	2.91	1.6

Table 4.2, Descriptive Statistics for Groups by Condition on Receptive Outcome Measures with Gain Scores and Number of Words Gained

Group	**Condition**	**Pre-Test**		**Post-Test**		**Gain Score**		**Words Gained**
		M	**SD**	**M**	**SD**	**M**	**SD**	
Typical	Co-Teach	5.73	1.43	7.85	1.29	2.11	1.48	2.1
	SLP Pullout	5.14	1.96	7.1	1.3	1.95	2.08	2
	Teacher	6.16	1.61	7.26	1.37	1.11	1.41	1.1
Low SES	Co-Teach	4.5	1.18	6.5	2.37	2	1.88	2
	SLP Pullout	3.44	1.51	5.56	1.74	2.11	1.76	2.1
	Teacher	4	1	6	2.08	2	2	2
Disability	Co-Teach	3.17	2.14	4.83	1.67	1.67	1.86	1.7
	SLP Pullout	5	0.82	6.29	2.06	1.28	1.79	1.3
	Teacher	4.57	2.44	5.57	3.04	1	1.41	1

4.2.2 Question 2: Effects of Student Groups

To answer the question regarding student group identification differences on outcome measures, the same repeated measures MANOVA test with post hoc analysis was consulted. There was a non-significant main effect of student group identification on vocabulary outcomes (Wilks $\Lambda = .956$, $F(4, 204) = 1.17$, $p = .325$, $\eta 2 = .022$). Therefore, it did not make a difference which condition students were taught in or which student identification group students were a part of, they all learned instructional vocabulary with explicit instruction.

4.2.2.1 Outcomes for Vocabulary Instruction

There was a significant effect of overall vocabulary instruction on outcome measures across all students in all service delivery conditions (Wilks $\Lambda = .326$, $F(2, 102) = 105.25$, $p = .000$, $\eta 2 = .674$). This suggests that explicit vocabulary instruction is effective regardless of who is delivering the vocabulary lessons.

Because there were significant effects of vocabulary instruction on pre- and post-outcome measures, we examined the tests of within subjects contrasts to determine where the significant differences occurred. There were significant effects of the intervention on the pre- and post-test measure outcomes, $p = .000$. There was also a significant outcome for the effect of service delivery conditions on the expressive measure, $p = .015$, this is because the multivariate test has more power to detect differences in conditions (Field, 2005). We used the partial Eta squared statistic to determine effect size. The suggested norms for partial eta squared effect sizes include small effects of .01, medium effects of .09 and large effects of 0.26 (Field, 2005). The tests of within subjects contrasts indicated significant differences between both pre-test and post-test measures for expressive

vocabulary (F (1, 103) = 148.69, p = .000, η2p = .591), and receptive vocabulary (F (1, 103) = 82.403, p = .000, η2p = .444) which are both large effect sizes (Field, 2005), (See Table 4.3).

The expressive and receptive measure score differences were compared. The students performed better on the expressive measure than the receptive measure. Mean score change for all students on the expressive measure was 4.86 points from pre to post-test compared to the receptive measure of 1.69 points from pre to post-test. This could be due to the fact that scores on the receptive pre-test measure were higher with a mean of 4.63 points out of a possible 9, compared to the expressive pre-test mean of 3.26 points out of a possible 18 (See Table 4.4). Pairwise comparisons of pre-test and post-test measures indicated that there was a significant difference between the two scores for both the expressive and the receptive measures (see Table 4.5).

Table 4.3, Within-Subjects Contrasts for Outcome Measures across Service Delivery Conditions and Student Groups

Source	Measure	Outcome	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Outcomes	Expressive	Linear	1012.494	1	1012.494	148.699	.000*	.591
	Receptive	Linear	122.824	1	122.824	82.403	.000*	.444
Outcomes * Conditions	Expressive	Linear	59.264	2	29.632	4.352	.015*	.078
	Receptive	Linear	2.327	2	1.163	.781	.461	.015
Outcomes * Groups	Expressive	Linear	20.686	2	10.343	1.519	.224	.029
	Receptive	Linear	2.89	2	1.445	.969	.383	.018
Outcomes * Conditions* Groups	Expressive	Linear	22.192	4	5.548	.815	.519	.031
	Receptive	Linear	1.776	4	0.444	.298	.879	.011
Error Outcomes	Expressive	Linear	701.331	103	6.809			
	Receptive	Linear	153.523	103	1.491			

a. Computed using alpha = .05*

Table 4.4, Estimates of Means for Expressive and Receptive Outcome Measures

Estimates					
Measure	**Outcome Measure**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	**Upper Bound**
Expressive	1 Pre-	3.266	0.23	2.81	3.722
	2 Post-	8.126	0.46	7.213	9.04
Receptive	1 Pre-	4.635	0.176	4.286	4.984
	2 Pre-	6.328	0.185	5.96	6.696

Table 4.5, Pairwise Comparisons of Differences Between Expressive and Receptive Outcome Measure Scores

Pairwise Comparisons							
Measure	**(I) Measure**	**(J) Measure**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval for Difference**	
						Lower Bound	**Upper Bound**
Expressive	1 Pre-	2 Post-	-4.861*	0.399	.000	-5.651	-4.07
	2 Post-	1 Pre-	4.861*	0.399	.000	4.07	5.651
Receptive	1 Pre-	2 Post-	-1.693*	0.186	.000	-2.063	-1.323
	2 Post-	1 Pre-	1.693*	0.186	.000	1.323	2.063

Based on estimated marginal means

The mean difference is significant at the .05 level.

Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments)

4.2.2.2 Post-Hoc Analysis

There were significant differences from pre-test to post-test across all students for expressive and receptive vocabulary outcomes. Therefore, post-hoc multiple comparison analysis was conducted using Tukey's Honestly Significant Differences (HSD) in order to examine all pairwise comparisons. Tukey's HSD was used instead of the more commonly used Bonferroni because of our smaller N (Field, 2005). This statistic shows us where the honestly significant differences occurred. As discovered earlier, there were no significant main effects of service delivery models on the difference between pre- and post-test scores, but in test comparisons there was a significant effect of service delivery conditions on the expressive measure. In post hoc, no significant differences were noted between any service delivery pair which is an anomaly because the multivariate tests have more power to detect the whole group, or condition differences (Field, 2005). (see Table 4.6). When examining the multiple comparisons between student groups (typical, low SES, disability), there were some significant differences noted in post-hoc. On the expressive measure, students in the typical group and low SES group outperformed students in the disability group, $p = .000$ and $p = .048$, respectively. On the receptive measure students in the typical group significantly outperformed students in both the low SES group and the disability group, $p = .000$, whereas there was a non-significant difference between the low SES group and the disability group, $p = .986$. (See Table 4.7)

Table 4.6, Post-Hoc Analysis of Service Delivery Conditions by Pre- and Post-Test Scores

Multiple Comparisons/Tukey HSD							
Measure	**(I) Condition**	**(J) Condition**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
						Lower Bound	**Upper Bound**
Expressive	Co-Teaching	SLP Pullout	1.036	0.63568	.238	-0.4757	2.5477
		Teacher	0.7121	0.65584	.525	-0.8475	2.2718
	SLP Pullout	Co-Teaching	-1.036	0.63568	.238	-2.5477	0.4757
		Teacher	-0.3239	0.67506	.881	-1.9292	1.2814
	Teacher	Co-Teaching	-0.7121	0.65584	.525	-2.2718	0.8475
		SLP Pullout	0.3239	0.67506	.881	-1.2814	1.9292
Receptive	Co-Teaching	SLP Pullout	0.4482	0.3233	.352	-0.3206	1.217
		Teacher	0.0833	0.33355	.966	-0.7099	0.8765
	SLP Pullout	Co-Teaching	-0.4482	0.3233	.352	-1.217	0.3206
		Teacher	-0.3649	0.34332	.539	-1.1813	0.4516

Table 4.6, (Continued)

Teacher	Co-Teaching	-0.0833	0.33355	.966	-0.8765	0.7099
	SLP Pullout	0.3649	0.34332	.539	-0.4516	1.1813

Based on observed means.

The error term is Mean Square (Error) = 2.056.

Table 4.7, Post Hoc Analysis of Group Identification by Pre- and Post-Test Scores

Multiple Comparisons/Tukey HSD							
			Mean Difference				
Outcomes	**(I) Group**	**(J) Group**	**(I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
						Lower Bound	**Upper Bound**
Expressive	Typical	SES	0.8578	0.65281	.391	-0.6946	2.4102
		Disability	2.8674*	0.71963	.000*	1.1561	4.5788
	SES	Typical	-0.8578	0.65281	.391	-2.4102	0.6946
		Disability	2.0096*	0.83855	.048*	0.0155	4.0037
	Disability	Typical	-2.8674*	0.71963	.000*	-4.5788	-1.1561
		SES	-2.0096*	0.83855	.048*	-4.0037	-0.0155
Receptive	Typical	SES	1.5338*	0.33201	.000*	0.7443	2.3233
		Disability	1.6030*	0.36599	.000*	0.7327	2.4734

Table 4.7, (Continued)

	SES	Typical	-1.5338	0.33201	.000*	-2.3233	-0.7443

	Disability	0.0692	0.42647	.986	-0.9449	1.0834
Disability	Typical	-1.603	0.36599	.000*	-2.4734	-0.7327
	SES	-0.0692	0.42647	.986	-1.0834	0.9449

Based on observed means.

The error term is Mean Square (Error) = 2.056.

*The mean difference is significant at the .05 level.

4.2.3 Question 3: Intensity Across Service Delivery Results

To answer the third question regarding how cumulative intensity affects vocabulary outcomes across service delivery conditions, the video recordings of each session were examined. One aspect of how instruction was delivered is the cumulative intervention intensity. We analyzed intervention intensity across the three service delivery conditions which included teaching episodes, dose form, session duration, dose frequency, total intervention duration and cumulative intervention intensity (Warren et al., 2007). This is an aspect of vocabulary instruction that is not often reported in the literature but has been documented as important for student learning (Baumann, 2009; Justice et al., 2017; Warren et al., 2007).

4.2.3.1 Teaching Episodes.

One aspect of cumulative intervention intensity is dose. Dose is defined in the literature as the number of properly administered teaching episodes in a single intervention session (Warren et al., 2007). It considers the average rate of teaching episodes per unit of time, the length of the session, and the distribution of TEs over the session (Warren et al., 2007). For this study, dose is counted as teaching episodes (TEs), which is the number of times the words and definitions were used together in a single intervention session by the instructors, the students, or both the instructors and students in a question/answer format or a choral response format. The PI did not control for TEs during this study, therefore averages for each of the service delivery conditions were used.

Intervention videos were watched in 5-minute increments from beginning to end in each service delivery condition. We counted TEs for each of the nine vocabulary

words for all intervention sessions and calculated the average for each service delivery condition. Table 4.8 shows the average number of TEs per word, the average range of the TEs per word for each service delivery condition, and the average cumulative number of TEs and average ranges for the three-word set taught in a session across all service delivery models. The SLP pullout condition had two separate sessions that were counted separately as SLP Session 1 (S1) and SLP Session 2 (S2) in order to determine differences between the first pullout group and second pullout group.

4.2.3.2 Dose Form

Dose form is the type of task or activity in which the TEs are delivered. Dose form was also not controlled for in this study. Across all conditions, the instructors developed their own lessons and chose which activities they used to teach the vocabulary words to the children. Therefore, a variety of dose forms were used across service delivery conditions and across sessions. One common dose form was repetition, where the instructor said the word and the definition, and the students repeated the words and definitions. Another dose form included ask and answer questions where the students were asked what the word was and then what the definition was. During some sessions games were played in a variety of ways that had students pair the words and definitions together, such as puzzles and scavenger hunts with student partners. Word games were utilized such as “would you rather…” where the instructors asked the students questions like “Would you rather organize the crayon box in our classroom or the toys in your bedroom, and why?”. Technology games were also utilized which incorporated drill like activities where the words or definitions were shown on an interactive white board, and

the student had to state the corresponding words or definitions accurately to keep the game going, which increased the TEs within a session.

4.2.3.3 Dose Frequency and Session Duration

Dose frequency is the number of times intervention occurs per day and per week (Warren et al., 2007). For the purposes of this study the dose frequency is one session per day, two days per week and was the same across all service delivery conditions with 12 sessions total. Session duration was held constant at 15-20 minutes per session twice per week. Therefore, the students in all service delivery conditions received 30-40 minutes of vocabulary instruction each week. Dose frequency and session duration were controlled for in this study and all teachers and SLPs were specifically instructed to keep all sessions within 15-20 minutes. With very few exceptions session duration was adhered to with fidelity. In two cases session duration went longer than 20 minutes and then the instructors were told to set a timer and not go over the 20 minutes in subsequent sessions. In two other sessions across service delivery conditions the sessions were less than 15 minutes due to time constraints within the school building (i.e. ran in to a lunch time, or other school-wide constraints). Average session duration was calculated by the average number of minutes spent in sessions for each service delivery condition and multiplied by dose frequency (12). Then we divided that number by 60 in order to get the average number of hours spent in intervention for each condition. Session duration averages are shown for minutes and hours in Table 4.8.

Table 4.8, Average Teaching Episodes, Ranges, and Totals per Word and Totals for 3 Word-Sets per Session for all Service Delivery Conditions

Word Sets	Word	Co-Teach (Range)	SLP S1 (Range)	SLP S2 (Range)	Teacher (Range)
	Demonstrate	4 (1 – 6)	5 (3 – 10)	6 (3 -10)	3 (1 – 6)
Word Set 1	**Expand**	6 (4 – 7)	6 (3 – 12)	6 (3 – 14)	3 (1 – 8)
	Define	5 (1 – 8)	5 (3 – 8)	7 (3 – 12)	2 (1 – 4)
	Recognize	5 (3 – 6)	5 (3 – 8)	5 (1 – 8)	2 (1 – 4)
Word Set 2	**Locate**	5 (3 – 6)	5 (4 – 6)	5 (4 – 6)	3 (1 – 4)
	Describe	5 (2 – 6)	4 (2 – 6)	4 (1 – 7)	2 (2 – 3)
	Produce	5 (2 – 8)	6 (4 – 8)	5 (3 – 9)	4 (1 – 9)
Word Set 3	**Organize**	4 (3 – 6)	6 (4 – 7)	5 (3 – 9)	3 (1 – 6)
	Contrast	4 (3 – 5)	4 (1 – 7)	6 (2 – 12)	3 (1 – 5)

Table 4.8, (Continued)

Average TE per word per session (Total Average Range)	4.78 (2.44 – 6.44)	5.11 (3.0 – 8.0)	5.44 (2.55 – 9.67)	2.78 (1.11 – 5.44)
Total average TEs for 3-word set per session (Total Average 3-word set Range)	14.34 (7.32 – 19.32)	15.33 (9 – 24)	16.32 (7.65 – 29.01)	8.34 (3.33 – 16.32)

SLP S1 = SLP pullout condition session 1

SLP S2 = SLP pullout condition session 2

4.2.3.4 Teaching Episode Intensity

According to Warren et al (2007), cumulative intensity of an intervention is the product of TEs x dose frequency x total intervention duration when controlling for one TE per minute. Because TEs were not controlled for in this study, we wanted to determine how many TEs per three-word set were delivered on average in each condition. Therefore, our equation looks different as we did not have one TE per word per minute. First, we used the cumulative TEs for the three-word sets shown in Table 4.8 and multiplied that number by 12 (intervention duration) to get cumulative TEs across intervention duration per service delivery condition. Then we divided the cumulative TEs by the total number of hours in session duration to get the distribution of TEs per hour of intervention (See Table 4.9). Finally, we divided 1 hour (60 minutes) by the number of TEs in the three-word set per hour to get the distribution of TEs in the three-word set per minutes within a session and this is the cumulative intensity (See Table 4.10).

The results of the TEs and cumulative intensity varied slightly among the three service delivery conditions. The co-teach, SLP group A and SLP group B conditions were all very close to averaging one TE per minute when all three words per session were considered. The teacher group's distribution of TEs for all three words in a session dropped to an average of 1 teaching episode in a little over every two minutes. The teacher group averaged close to half of the number of TEs per session compared to the SLP groups A and B (see Table 4.10).

Table 4.9, Average Intervention Session Duration by Minutes and Hours for Each Service Delivery Condition

Condition	Average Session duration in minutes	Total average duration in minutes	Total average duration in hours
Co-Teach	17	204 minutes	3.4 hours
SLP S1	19	228 minutes	3.8 hours
SLP S2	18	216 minutes	3.6 hours
Teacher	19	228 minutes	3.8 hours

Table 4.10, Total Average Teaching Episode Intensity for 3-Word Sets per Session

Service Delivery Condition	Average TEs per session	Total Average TEs over 12 sessions	Distribution of Average TEs per hour	Distribution of Average Total TEs per minute
Co-Teach	14.34	172.08	50.61	1 in 1.18 minutes
SLP S1	15.33	183.96	48.41	1 in 1.23 minutes
SLP S2	16.32	195.84	54.40	1 in 1.10 minutes
Teacher	8.34	100.08	26.34	1 in 2.28 minutes

CHAPTER 5. DISCUSSION

This chapter discusses the conclusions indicated by the data analysis presented in chapter four and includes a review and discussion of a) Purpose and Methods, b) Data Analysis, c) Limitations and Implications for Future Research, and d) Conclusions.

5.1 Purpose and Methods

The present study aimed to determine if the co-teaching method, the process by which two professionals jointly plan and teach a lesson, produced differential effects on children's vocabulary learning as compared to traditional service delivery practices employed by SLPs and classroom teachers. The PI sought to answer the following questions,

Question 1: What are the main effects of three service delivery models a) co-teaching, b) SLP pullout, and c) teacher on vocabulary learning of instructional verbs by 2nd grade students?

Question 2: What are the main effects of the three service delivery models a) co-teaching, b) SLP pullout, and c) teacher on vocabulary learning of instructional verbs by children identified at risk for literacy deficits (i.e. students from low SES households and students with disabilities) compared to typical students?

Question 3: How does cumulative intervention intensity affect vocabulary outcomes among the three service delivery models a) co-teaching, b) SLP pullout, and c) teacher)?

The PI recruited three elementary schools in the Central Kentucky region with nine adult and 112 child participants from nine second grade classrooms. The PI trained SLPs and teachers in a two-hour PD to provide rich vocabulary instruction and use of the

different service delivery conditions. Pre- and post-testing on expressive and receptive vocabulary measures was carried out by the RAs. The teachers and SLPs planned and delivered 12 lessons across six weeks to teach nine instructional verbs. Fidelity measures collected included videos of all the intervention sessions and checklists completed by the RAs.

To answer each of the proposed research questions, the PI completed quantitative data analysis with follow up video data analysis. The pre- and post-tests were scored by one trained RA and 25% of all the tests were checked for reliability of scores. Interrater reliability was 100% between the trained scorer and the PI for all pre- and post-tests. Repeated measures MANOVA was utilized to determine the interaction effects within subjects for service delivery conditions and student group identification across the expressive and receptive vocabulary outcome measures. Video recordings were watched by the PI to corroborate fidelity and collect data for cumulative teaching episodes and intensity of the vocabulary instruction across service delivery conditions.

5.2 Discussion

The following discussion includes a summary of study findings and is based on the research questions guiding this study.

5.2.1 Question 1: Effects of Three Service Delivery Models.

Complete data sets were collected from 112 child participants. Using repeated measures MANOVA, the main effects of the three service delivery conditions on vocabulary word learning by second grade students was not significant, $p = .055$. Service delivery conditions also did not predict a significant effect for outcomes of any student

identification group (typical, low SES, disability), p = .825. Rather, students in all service delivery conditions learned words at a significant level from pre- to post-test, p = .000.

We determined the effect size of vocabulary intervention using the partial Eta squared statistic based on Field (2005), where a large effect size is .26, a medium effect size is .09, and a small effect size is .01. In the present study vocabulary instruction on expressive and receptive vocabulary outcome scores were associated with a large effect size, $\eta^2_p = .591$, and $\eta^2_p = .444$, respectively. Service delivery condition effects on expressive vocabulary outcomes were associated with a near medium effect size, $\eta^2_p = .078$, and receptive outcomes were associated with a small effect size, $\eta^2_p = .015$.

In this study second-grade students in all service delivery conditions learned instructional verbs regardless of who was providing the vocabulary instruction. We initially hypothesized that students in the co-teaching condition would learn instructional vocabulary significantly better than the students in the traditional service delivery conditions based on findings of previous studies. The results of this study do not support our hypothesis regarding service delivery conditions and differ from the previous research. Throneburg et al. (2000) indicated that students receiving instruction in the collaborative approach learned curricular vocabulary better than in the teacher-SLP independent groups and the traditional SLP pullout models. Other studies by Farber and Klein (1999) and Ellis et al. (1995) investigated collaborative and consultative service delivery and similarly found that the collaborative approach improved language skills for preschool children compared to traditional teaching instruction.

There are several possible reasons why there are no differences among service delivery conditions in our study compared to previous studies. In the present study, all

adult participants were trained in the tenets of rich vocabulary instruction which included a 2-hour in-person professional in-service event, and were given support documents in the form of a planning worksheet and preassigned days for when each set of words would be taught. In previous studies of vocabulary learning among service models, the authors did not report that training on best practices in vocabulary instruction occurred (Ellis, Schlaudecker, & Regimbal, 1995; Farber & Klein, 1999; Throneburg et al., 2000).

Another possible reason for the lack of differences among service delivery models is that instructional time was pre-determined and held constant across all conditions. As part of the study's methodology, the teachers and SLPs were instructed to keep lesson duration to 15 – 20 minutes. In previous studies, instructional time was held constant, however session duration and total intervention duration was longer (Ellis et al., 1995; Farber & Klein, 1999; Throneburg et al., 2000). In the Throneburg et al., (2000) study, students in the co-teaching condition received one 40-minute session per week and an additional 15 minutes for pullout services for students with speech and language needs. In Farber & Klein (1999), the students in the collaborative teacher-therapist group received significantly more intervention time of 2.25 hours per week across the school year as compared to the children in the teacher only groups. In both studies students in the collaborative groups made significant gains compared to the children in the teacher only group.

Finally, the present study reflected best practices in vocabulary instruction by adhering to the principals of distributed learning. The study was designed for each set of three words to be taught initially, then reviewed three more times across the six-week intervention period. Spaced exposure to learning targets is the concept of revisiting

learned material throughout the intervention duration and has been shown to be superior to massed exposure (Cepeda, Pashler, Vul, Wixted, & Rohrer, 2006; McGregor, Marshall, Julian, & Oleson, 2019; Sobel, Cepeda, & Kapler, 2011). The advantage of spaced exposure over massed exposure (i.e. many repetitions of a learning target in one session) for children is well documented for word meanings (Sobel, Cepeda, & Kapler, 2011).

In previous studies it was unclear whether the words taught were repeated across the intervention duration. In the Throneburg et al., (2000) article, the SLPs and teachers jointly planned and taught the curricular vocabulary during the collaborative intervention in the classroom and then students who received speech-language therapy services received the same instruction in small group pullout environments, so there was some degree of word repetition within each week, but most likely not repeated across weeks. In the Farber & Klein (1999), and Ellis et al., (1995) studies there is no mention if the words were targeted repeatedly over the course of intervention. This may be important as spaced targeted practice with vocabulary has been shown to be essential for learning. Spaced practice for word meanings is superior to massed practice and has been shown to be important for students with learning challenges as they have difficulty with retention, therefore they need repetition over time (Riches, Tomasello, & Conti-Ramsden, 2005).

Future researchers may want to examine the contribution of SLPs to a co-teaching model in the absence of formal teacher training in best practices in vocabulary teaching. Co-teaching is a symbiotic relationship that forms between two professionals – each professional contributing his or her expertise to form rich and multifaceted learning experience for all students. SLPs possess working knowledge of best practices in

semantic instruction. SLPs within a co-teaching model may indirectly serve as a source of professional development for the classroom teacher and by consequence improve the quality of overall vocabulary instruction.

5.2.2 Question 2: Effects of Service Delivery by Student Group

Again, there were significant gains from pre- to post-test for all students regardless of student group identification or service delivery condition. The main effects of the three student identification groups (i.e. typical, low SES, disability) on vocabulary word learning were not significant, $p = .325$. Group identification effects on vocabulary learning were associated with small effect sizes on both expressive measures ($\eta^2_p = .029$), and receptive measures ($\eta^2_p = .018$).

Post-hoc analysis revealed significant differences on outcome measures between the student groups. Students in the typical and low SES groups significantly outperformed students in the disability group on the expressive measure. Students in the typical group significantly outperformed students in both of the at-risk groups, low SES and disability, on the receptive measure.

In the present study all student groups (typical, low SES, disability) learned instructional verbs across the six-week intervention period. We initially hypothesized that students in the typical and low SES groups would learn the taught words because neither of these groups require differentiated instruction as the status of low SES alone does not inhibit learning. Even though students from low SES backgrounds enter school with a knowledge gap in vocabulary, they are able to learn with focused instruction (Adlof, 2019; Beck & McKeown, 2007). Students in the disability group also significantly learned words which may be attributed to the rich vocabulary instruction

that was delivered in each service delivery condition. This instruction may have provided adequate opportunities for students with disabilities to practice the words and interact with them in focused extension activities which have been shown to be effective with children with disabilities (Adlof, 2019; Beck et al., 2013; Kan & Windsor, 2010; Wei, Blackorby, & Schiller, 2011).

When we began to parse out outcomes by modality of word learning, expressive versus receptive, some differences were noted. In the expressive vocabulary outcomes, the students in the typical and low SES groups significantly outperformed the students in the disability group. Short-term memory skills, which are essential for word learning, may be a contributing factor to group differences. Students in the typical and low SES groups may have had sufficient short term memory to retain the meanings of the words taught at the time of post-testing (Cepeda et al., 2006; Kan & Windsor, 2010). The students in the disability group may not have been able to learn or express the definitions for the same number of words on the outcome measures due to differences in short-term memory skills. Recent studies have reported that children with developmental language disorder demonstrated significant forgetting once treatment was withdrawn, even after just 5 – 6 days (Riches, Tomasello, & Conti-Ramsden, 2005; Storkel et al., 2019). This may have been the case for our students with disabilities as post-testing occurred the week following the final intervention session.

While significant gains on the receptive measure were noted, the students in the low SES and disability groups did not perform as well as their typical peers. This may be attributed to a disconnect between the testing format and the instructional activities. The receptive vocabulary measure presented a semantically loaded yes/no question to the

student – “Would you recognize a person you have never met?” The students had to decide if the association between the semantic feature and the word were correct. Most of the teaching episodes provided numerous opportunities to learn the word and definitions. Fewer activities were dedicated to rich semantic understanding of the word. This lack of semantic instruction coupled with fewer opportunities to practice the yes/no nature of the receptive measure may account for a portion of the group differences noted. Furthermore, students who are at risk for literacy difficulties, including low SES students and students with disabilities, often have less developed vocabulary knowledge initially which impacts their ability to benefit from instruction at the same rate as their typical peers (Coyne et al., 2010; Cuticelli et al., 2015).

While the disability group was heterogenous in nature, we analyzed the data as a homogenous group. As a result, we are unable to parse out vocabulary learning by disability type. Therefore, future researchers may want to investigate service delivery effects by disability type.

5.2.3 Question 3: Intensity Across Service Delivery Models

The data collected in this study adds significant information regarding teaching intensity – teaching episodes (TEs) distributed over session duration, as well as minimum durations of service delivery with significant outcomes for student learning. Very few studies report teaching episodes (i.e. dose) or treatment intensity surrounding vocabulary and the ones that do, only report exposures to words (Baumann, 2009; Storkel et al., 2019; Warren et al., 2007).

Videos were analyzed to collect data on TEs for words and session duration. A TE was counted when the word and definition were used together by the instructors when

teaching the words, by the students when asked to give words and definitions together, or by both instructors and students in a question/answer or choral response format. The results of the analysis of TEs indicate that the average number of TEs ranged from a high of 5.44 TEs to a low of 2.78 TEs per word per 17 – 19-minute session across a six-week intervention period.

We hypothesized that because SLPs have expert knowledge about provision of rich vocabulary instruction (ASHA, 2004; Beck, et al., 2013), and knowledge about the effects of treatment intensity (Warren et al., 2007), the conditions where the SLP was involved would have more intense instruction. The results of our analysis confirmed this hypothesis. In the conditions where an SLP was involved gain scores on the expressive measure were approximately twice that of the teacher condition. Furthermore, the average session duration for all conditions was similar, therefore the overall TE intensity for conditions where the SLPs were involved was higher than in the teacher condition.

When parsing out effects of the teaching intensity on the receptive measure, students in all service delivery conditions made smaller gains of only 1-2 words across all student groups despite the teaching intensity provided. This could be explained by fewer opportunities being provided for students to practice the semantic information in the context of sentences to help the students answer the yes/no questions on the receptive measure. The planning framework of this study did not include planning for answering questions in ways like how the questions on the receptive measure were asked.

Because very few studies report treatment intensity when teaching vocabulary, future research in this area is needed. In a recent study by Storkel et al. (2019), it was reported that 36 exposures to words were adequate for students to learn taught words

within the context of a book reading activity. However, there are differing definitions of what exposure to a word is, including everything from hearing the word in the context of a story or sentence, pairing the word with a child friendly definition, pairing the word with a picture, and pairing the word with a synonym (Baumann, 2009; Justice et al., 2017; Storkel et al., 2019; Warren et al., 2007). SLPs need more information regarding what type of exposure is adequate and if that is the same for diverse types of vocabulary words (i.e. nouns vs verbs) and for students with a variety of disability types.

5.3 Implications

The findings of this study indicated that when rich vocabulary instruction was provided all students learned vocabulary regardless of who provided the instruction. Students in all conditions learned words better on the expressive measure, than on the receptive measure. Within each service delivery condition, students were afforded the opportunity to verbally practice pairing the words with definitions throughout extension activities which provided stronger outcomes on the expressive vocabulary measure. Students were given fewer opportunities to practice semantic organization of words in context of sentences which may have impacted gains on the receptive measure.

While findings indicated that students in all groups learned words, group differences existed. At the expressive level, typical and low SES students learned more instructional verbs than students in the disability group. For the receptive outcome, students in the typical group significantly outperformed their peers in the low SES and disability groups. The study design was solid for implementation of rich vocabulary instruction across service delivery models and for teaching all students. Differences in student group performances may be explained by opportunities afforded students to

practice words in a variety of contexts to build semantic organization which could help deepen vocabulary learning.

This study adds information to the literature regarding intensity of instruction over time. Findings of this study suggest that a minimum of one TE (word and definition pair) every 1.23 minutes within the context of rich vocabulary instruction is required for students in all student groups to learn approximately 2-4 words. Warren et al. (2007) reported effective dose as one teaching episode per minute of instruction and the outcomes of this study came very close to reaching that same intensity in the co-teaching and SLP pullout conditions.

Finally, findings support SLPs use of co-teaching as a more efficient mechanism for teaching vocabulary. The SLPs in this study spent twice as much time in the pullout condition and saw fewer students as compared to the co-teaching condition. The implications are that when time is used efficiently, SLPs can spend significantly less time in co-teaching intervention using high intensity TEs for instructional verbs and have significant outcomes on learning for all students.

5.4 Limitations

There were several limitations of this study. One limitation may have been that training was provided to all instructors in each service delivery conditions, therefore there was not a true control group absent of training. Another limitation of this study may have been that intervention was geared toward expressive learning in a similar style that words were assessed on the expressive measure, but the same opportunities were not given to students regarding receptive learning of the words. Finally, the heterogenous disability

group was analyzed as a homogenous group, therefore we were unable to parse out vocabulary learning by disability type.

5.5 Future Directions in Research

There are several future directions in research regarding vocabulary learning and service delivery conditions. Researchers are encouraged examine the contribution of SLPs to a co-teaching model in the absence of formal teacher training in best practices in vocabulary teaching. In the present study professional development provided all conditions, including the teacher condition, a means to learn tenets of rich vocabulary instruction. Another area for investigation is service delivery effects by disability type. This study did not parse out the disability type for each student which may have impacted the outcomes for this student group. Finally, future researchers may want to determine what type of exposure to vocabulary words is adequate and if that is the same for different types of vocabulary words (i.e. nouns vs. verbs) and for students with a variety of disability types.

5.6 Conclusion

Effective collaboration among education professionals, which has been mandated by IDEA (2004), is crucial to the effectiveness of any school and to the learning and well-being of all of the students (Pfeiffer et al., 2019). From a multi-tiered system of supports (MTSS) framework that is used in schools across the United States (Squires, Gillam, & Ray Reutzel, 2013), co-teaching may be a viable and cost-effective option for provision of services by SLPs in reaching students with IEPs and students at risk who may not have an IEP for speech and language therapy.

This study further confirms that rich vocabulary instruction works with all children when teaching instructional vocabulary. When instruction remains very focused with approximately 1 TE per minute, all students including students with disabilities are able to learn words. In service delivery conditions where the SLP was involved a greater number of teaching episodes occurred and greater gains were made in expressive vocabulary. These findings suggest that SLPs might be able to increase their use of the co-teaching model in regular education classrooms with significant vocabulary gains for all students. Furthermore, when providing pullout sessions for students with speech and language needs, sessions can be less than the traditional 30 minutes and highly focused with high TE intensity. It may be time for all SLPs in schools to move away from the traditional 30-minute pullout model.

SLPs may be seeking to change policies in their school districts regarding service delivery due to an ever-expanding scope of practice (Ward, 2019). Cost-efficiency, in terms of SLPs' time, utilizing service delivery methods such as co-teaching models and employing intense and focused instruction, may have benefits for both the SLP and the schools they serve. SLPs may be able to provide services to students on their caseloads, reach students at risk in the classroom environment, and provide ongoing training for teachers in rich vocabulary instruction. This study presents some guidelines for provision of training in rich vocabulary instruction by SLPs for school administration and personnel that could drive improvements in vocabulary instruction for school-wide programs such as IDEA mandated Response to Intervention services.

APPENDICES

APPENDIX A, EXPRESSIVE VOCABULARY MEASURE AND RUBRIC

I am going to ask you what a word means. For example, I will say "What does leave mean?" You might say "I walk out of a room when I leave it." OR "Leave means to go out or exit a place." You can tell me what the word means in a sentence or give me the meaning of the word in a definition. As in leave means to go out or exit.

Now it is your turn to try one. "What does **begin** mean?"

If you said, 'to start something' or 'If I begin my work that means I start it.' That is correct. Let's do the next one.

0	**1**	**2**
No knowledge of the target word -No response -Inappropriate use of the word in a phrase or sentence -Inappropriate definition -Restatement -Phonological manipulation	Incomplete knowledge of the target word -Appropriate use of the word in a sentence -Vague or imprecise definition -Imprecise synonym	Complete knowledge of the target word -Precise use of the target word in a phrase or sentence -Precise definition

1. What does 'demonstrate' mean?
   _____
2. What does 'expand' mean?
   _____
3. What does 'define' mean?
   _____
4. What does 'recognize' mean?
   _____
5. What does 'locate' mean?
   _____
6. What does 'describe' mean?
   _____
7. What does 'produce' mean?
   _____
8. What does 'organize' mean?
   _____
9. What does 'contrast' mean?
   _____

Scores:

1_____ 2_____ 3_____ 4_____ 5_____ 6_____
7_____ 8_____ 9_____ **Total**_____/18 Points

APPENDIX B, TWO QUESTION VOCABULARY MEASURE

You will be asked questions about vocabulary words. Your job is to answer each question with yes or no.
For example: **Do you walk out the door when you leave? Yes or No _____**?
If you answered yes, that would be correct. We are leaving when we walk out the door.
Let's try another one.
Would you be leaving if you stayed in your seat? Yes or No _____? If you answered no, that would be correct. We don't stay in our seats when we leave.
Listen carefully and let's begin.

Sentence	**Yes**	**No**	***IDK***
1. Will a chair expand when you sit on it?			
2. Could you contrast a shoe and a boot?			
3. Can you locate milk in the refrigerator?			
4. Do you organize when you open a present?			
5. Could you describe your teacher to a friend?			
6. Does your desk produce books?			
7. Do you demonstrate when you watch television?			
8. Could you define a word you know?			
9. Does a balloon expand when you blow into it?			
10. Do you define your lunch?			
11. Would you recognize a person you have never met?			
12. Could you contrast one picture?			
13. Does a stove produce heat?			
14. Could you organize the things in your desk?			
15. Do you lose a toy when you locate it?			
16. Could someone demonstrate running?			
17. Do you describe when you listen to a story?			
18. Could you recognize a picture of your teacher?			

Total Score _____/9 Points

REFERENCES

Adlof, S. M. (2019). Prologue to the forum: Vocabulary across the school grades. *Language Speech & Hearing Services in Schools, 50*(4), 461-465. doi:10.1044/2019_LSHSS-19-00007

ASHA. (1991). A model for collaborative service delivery for students with language-learning disorders in the public schools [Relevant Paper]. Retrieved from www.asha.org/policy.

ASHA. (1996). Inclusive practices for children and youths with communication disorders [Technical Report]. Retrieved from www.asha.org/policy

ASHA. (2001). Roles and responsibilities of speech-language pathologists with respect to readng and writing in children and adolescents. [Position Statement]. Retrieved from https://www.asha.org/policy/PS2001-00104/

ASHA. (2010). Roles and responsibilities of speech-langauge pathologists in schools. [Professional Issues Statement]. Retrieved from www.asha.org/policy.

ASHA. (2016). Schools survey report: Caseload characteristics trends, 1995–2016. Retrieved from www.asha.org

ASHA. (2018a). Changes in SLP certification standards coming in 2020. *The ASHA Leader, 23*(11), 61. doi:https://doi.org/10.1044/leader.AN8.23112018.61

ASHA. (2018b). Schools survey report: Caseload characteristics trends, 2000-2018.*2018*(July, 25, 2019). Retrieved from American Speech-Language-Hearing Association website: www.asha.org.

Ashworth, K. E., & Pullen, P. C. (2015). Comparing regression discontinuity and multivariate analyses of variance: Examining the effects of a vocabulary intervention for students at risk for reading disability. *Learning Disability Quarterly, 38*(3), 131-144. doi:10.1177/0731948714555020.

August, D., Artzi, L., & Barr, C. (2016). Helping ELLs meet standards in english language arts and science: An intervention focused on academic vocabulary. *Reading & Writing Quarterly, 32*(4), 373-396. doi:10.1080/10573569.2015.1039738

Baker, D. L., Santoro, L., Ware, S., Cuéllar, D., Oldham, A., Cuticelli, M., Coyne, M. D., Loftus-Rattan, S., & McCoach, B. (2015). Understanding and implementing the common core vocabulary standards in kindergarten. *Teaching Exceptional Children, 47*(5), 264–271. https://doi-org.ezproxy.uky.edu/10.1177/0040059915580028.

Barnes, M. K. (1999). Strategies for collaboration: A collaborative teaching partnership for an inclusion classroom. *Reading & Writing Quarterly: Overcoming Learning Difficulties, 15*(3), 233-238. doi:10.1080/105735699278206

Baumann, J. F. (2009). Intensity in vocabulary instruction and effects on reading comprehension. *Topics in Language Disorders, 29*(4), 312-328.

Beach, K. D., Sanchez, V., Flynn, L. J., & O'Connor, R. E. (2015). Teaching academic vocabulary to adolescents with learning disabilities. *Teaching Exceptional Children, 48*(1), 36-44.

Beck, A. R., & Dennis, M. (1997). Speech-language pathologists' and teachers' perceptions of classroom-based interventions. *Language, Speech & Hearing Services in Schools, 28*(2), 146-153.

Beck, I. L., & McKeown, M. G. (2007). Increasing young low-income children's oral vocabulary repertoires through rich and focused instruction. *Elementary School Journal, 107*(3), 251.

Beck, I. L., McKeown, M. G., & Kucan, L. (2013). *Bringing words to life: Robust vocabulary instruction. Second Edition*. New York, NY The Guilford Press.

Biemiller, A. (2001). Teaching vocabulary: Early, direct, and sequential. *American Educator, 25*(1), 24-28,47.

Biemiller, A., & Boote, C. (2006). An effective method for building meaning vocabulary in primary grades. *Journal of Education Psychology, 98*(1), 44-62.

Blachowicz, C. L. Z., Fisher, P. J. L., Ogle, D., & Watts-Taffe, S. (2006). Vocabulary: questions from the classroom. *Reading Research Quarterly, 41*(4), 524–539. https://doi-org.ezproxy.uky.edu/10.1598/RRQ.41.4.5

Blosser JL, & Kratcoski A. (1997). PACs: a framework for determining appropriate service delivery options... providers, activities, and contexts. *Language, Speech & Hearing Services in Schools*, *28*(2), 99–107.

Boyle, J., McCartney, E., Forbes, J., & O'Hare, A. (2007). A randomised controlled trial and economic evaluation of direct versus indirect and individual versus group modes of speech and language therapy for children with primary language impairment. *Health Technology Assessment, 11*(40), 1-139.

Brandel, J., & Loeb, D. F. (2011). Program intensity and service delivery models in the schools: SLP survey results. *Language, Speech & Hearing Services in Schools*, *42*(4), 461–490. https://doi-org.ezproxy.uky.edu/10.1044/0161-1461(2011/10-0019

Brandel, J., & Loeb, D. F. (2012). Service delivery in schools: A national survey. *The ASHA Leader, 17*(1),. doi:10.1044/leader.SCM.17012012.np

Bryk, A. S., & Raudenbush, S. W. (1992). *Hierarchical linear models: Applications and data analysis methods*. Thousand Oaks, CA, US: Sage Publications, Inc.

Catts, H. W., Hogan, T. P., & Adlof, S. M. (2005). Developmental changes in reading and reading disabilities. In H. W. Catts & A. G. Kamhi (Eds.), *The Connections Between Language and Reading Disabilities.* (pp. 25-40). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Cepeda, N. J., Pashler, H., Vul, E., Wixted, J. T., & Rohrer, D. (2006). Distributed practice in verbal recall tasks: A review and quantitative synthesis. *Psychological Bulletin, 132*(3), 354-380. doi:10.1037/0033-2909.132.3.354

Cirrin FM, Schooling TL, Nelson NW, Diehl SF, Flynn PF, Staskowski M, Torrey TZ, & Adamczyk DF. (2010). Evidence-based systematic review: effects of different service delivery models on communication outcomes for elementary school-age children. *Language, Speech & Hearing Services in Schools*, *41*(3), 233–264. https://doi-org.ezproxy.uky.edu/0161-1461(2009/08-0128)

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Conderman, G. (2011). Middle school co-teaching: Effective practices and student reflections. *Middle School Journal (J3), 42*(4), 24-31.

Coxhead, A. (2000). A new academic word list. *TESOL Quarterly, 34*(2), 213 - 238.

Coyne, M. D., McCoach, D. B., & Kapp, S. (2007). Vocabulary intervention for kindergarten students: Comparing extended instruction to embedded instruction

and incidental exposure. *Learning Disability Quarterly*, *30*(2), 74–88. https://doi-org.ezproxy.uky.edu/10.2307/30035543

Coyne, M. D., McCoach, D. B., Loftus, S., Zipoli, R., Jr., Ruby, M., Crevecoeur, Y. C., & Kapp, S. (2010). Direct and extended vocabulary instruction in kindergarten: Investigating transfer effects. *Journal of Research on Educational Effectiveness*, *3*(2), 93–120.

Creswell, J. W. (2018). *Research design : qualitative, quantitative, and mixed methods approaches* (Fifth edition. ed.): Thousand Oaks, California : SAGE Publications, Inc.

Curtis, M. E. (1987). Vocabulary testing and vocabulary instruction. In M. G. McKeown & M. E. Curtis (Eds.), *The nature of vocabulary acquisition.* (pp. 37-51). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc

Cuticelli, M., Coyne, M. D., Ware, S. M., Oldham, A., & Loftus Rattan, S. (2015). Improving vocabulary skills of kindergarten students through a multi-tier instructional approach. *Intervention in School & Clinic*, *50*(3), 150–156. https://doi-org.ezproxy.uky.edu/10.1177/1053451214542041

Dodge, E. P. (2004). Communication skills: the foundation for meaningful group intervention in school-based programs. *Topics in Language Disorders*, *24*(2), 141-156 116p.

Duchan, J. F. (2010). The early years of language, speech, and hearing services in U.S. schools. *Language, Speech & Hearing Services in Schools, 41*(2), 152-160. doi:10.1044/0161-1461(2009/08-0102)

Dunn, L. M., & Dunn, L. M. (1997). Peabody Picture Vocabulary Test--Third Edition examiner's manual. Circle Pines, MN: American Guidance Service.

Ehren, B. J. (2000). Clinical forum. Maintaining a therapeutic focus and sharing responsibility for student success: keys to in-classroom speech-language services. *Language, Speech & Hearing Services in Schools, 31*(3), 219-307.

Ehren, B. J. (2015). Shout it out: We are critical to students' academic achievement. *ASHA Leader*, *20*(9), 6-8.

Elksnin, L. K. (1997). Collaborative speech and language services for students with learning disabilities. *Journal of Learning Disabilities*, *30*(4), 414–426.

Elksnin, L. K., & Capilouto, G. J. (1994). Speech-language pathologists' perceptions of integrated service delivery in school settings. *Language, Speech & Hearing Services in Schools*, *25*(4), 258. https://doi-org.ezproxy.uky.edu/10.1044/0161-1461.2504.258

Eller, R. G., Pappas, C. C., & Brown, E. (1988). The lexical development of kindergartners: Learning from written context. *Journal of Reading Behavior, 20*(1), 5-24.

Ellis, L., Schlaudecker, C., & Regimbal, C. (1995). Effectiveness of a collaborative consultation approach to basic concept instruction with kindergarten children. *Language, Speech & Hearing Services in Schools, 26*(1), 69-74.

Farber J,.G., & Klein, E.R. (1999). Classroom-based assessment of a collaborative intervention program with kindergarten and first-grade students. *Language, Speech & Hearing Services in Schools*, *30*(1), 83–91.

Field, A. (2005). *Discovering statistics using SPSS, 2nd ed*. Thousand Oaks, CA: Sage Publications, Inc.

Flynn, P. (2010). New service delivery models: connecting SLPs with teachers and curriculum. *The ASHA Leader, 15*(10), 22-22. doi:10.1044/leader.SCM1.15102010.22

Freebody, P., & Anderson, R. C. (1981). *Effects of differing proportions and locations of difficult vocabulary on text comprehension. Technical report No. 202*. Retrieved from http://ezproxy.uky.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=ED201992&site=ehost-live&scope=site

Friend, M. (2008). *Co-Teach! A handbook for creating and sustaining effective classroom partnerships in inclusive schools.* Greensboro, NC: Marilyn Friend, Inc.

Friend, M. (2015). Welcome to co-teaching 2.0. *Educational Leadership, 73*(4), 16-22.

Friend, M., Cook, L., Hurley-Chamberlain, D., & Shamberger, C. (2010). Co-teaching: An illustration of the complexity of collaboration in special education. *Journal of Educational & Psychological Consultation, 20*(1), 9-27. doi:10.1080/10474410903535380

Glastetter-Stone, L (2018) Service Delivery Models for School Based SLPs, Push-In vs. Collaboration. *The Informed SLP*. http://www.theinformedslp.com/qa_push_in.html

Glover. (2015). Collaboration between teachers and speech and language therapists: Services for primary school children with speech, language and communication needs. *Child Language Teaching & Therapy, 31*(3), 363-382 320p. doi:10.1177/0265659015603779

Hall P, & Weaver L. (2001). Interdisciplinary education and teamwork: a long and winding road. *Medical Education, 35*(9), 867–875.

Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children*. Baltimore, MD.: Paul H Brookes Publishing.

Hart, B., & Risley, T. R. (2003). The early catastrophe. The 30 million word gap. *American Educator, 27*(1), 4-9.

Hartas, D. (2004). Teacher and speech-language therapist collaboration: being equal and achieving a common goal? *Child Language Teaching & Therapy, 20*(1), 33-54.

IDEA. (2004). Individuals with Disabilities Act. Retrieved from sites.ed.gov/idea/about-idea/

Justice, L. M., Logan, J., Jiang, H., & Schmitt, M. B. (2017). Algorithm-driven dosage decisions (AD3): Optimizing treatment for children with language impairment. *American Journal of Speech-Language Pathology, 26*(1), 57-68. doi:10.1044/2016_AJSLP-15-0058

Justice, L. M., Meier, J., & Walpole, S. (2005). Learning new words from storybooks: An efficacy study with at-risk kindergartners. *Language, Speech & Hearing Services in Schools, 36*(1), 17-32. doi:10.1044/0161-1461(2005/003)

Kamens, M. W., Susko, J. P., & Elliott, J. S. (2013). Evaluation and supervision of co-teaching: A study of administrator practices in new jersey. *NASSP Bulletin, 97*(2), 166-190.

Kan, P. F., & Windsor, J. (2010). Word learning in children with primary language impairment: a meta-analysis. *Journal of Speech, Language & Hearing Research, 53*(3), 739-756 718p. doi:1092-4388(2009/08-0248)

Kearns, G., & Biemiller, A. (2010). Two-questions vocabulary assessment: Developing a new method for group testing in kindergarten through second grade. *Journal of Education*, *190*(1/2), 31–41. https://doi-org.ezproxy.uky.edu/10.1177/0022057410190001-206

Kent-Walsh, J., Stark, C., & Binger, C. (2008). Tales from school trenches: AAC service-delivery and professional expertise. *Seminars in Speech & Language, 29*(2), 146-154.

Lindeman, K. W., & Magiera, K. (2014). A co-teaching model: Committed professionals, high expectations, and the inclusive classroom. *Odyssey: New Directions in Deaf Education*, *15*, 40-45.

Loftus-Rattan, S. M., Mitchell, A. M., & Coyne, M. D. (2016). Direct vocabulary instruction in preschool: A comparison of extended instruction, embedded instruction, and incidental Exposure. *Elementary School Journal*, *116*(3), 391–410.

Loftus, S. M., Coyne, M. D., McCoach, D. B., Zipoli, R., & Pullen, P. C. (2010). Effects of a supplemental vocabulary intervention on the word knowledge of kindergarten students at risk for language and literacy difficulties. *Learning Disabilities Research & Practice (Wiley-Blackwell), 25*(3), 124-136. doi:10.1111/j.1540-5826.2010.00310.x

Lowman, J., Stone, L. T., & Guo, J. (2018). Effects of interactive book reading for increasing children's knowledge of instructional verbs. *Communication Disorders Quarterly*, *39*(4), 477-489.

Martín-Andrés, A., & Álvarez-Hernández, M. (2020). Hubert's multi-rater kappa revisited. *British Journal of Mathematical & Statistical Psychology*, *73*(1), 1-22. doi:10.1111/bmsp.12167

McDonald, R. A. (1915). Provisions for speech defectives. In *Adjustment of school organization to various population groups* (pp. 85 - 89). New York, NY: Columbia University Teachers College.

McGregor, K. K., Marshall, B. A., Julian, S. K., & Oleson, J. (2019). Learning while playing: A randomized trial of serious games as a tool for word mastery. *Language, Speech, & Hearing Services in Schools, 50*(4), 596-608.

McWilliam, R. A., & Bailey Jr., D. B. (1994). Predictors of service-delivery models in center-based early intervention. *Exceptional Children*, *61*(1), 56. https://doi-org.ezproxy.uky.edu/10.1177/001440299406100106

Meriam-Webster. (2017). Collaboration. . Retrieved from www.merriam-webster.com/dictionary/collaboration

Meyers, J., Gelzheiser, L., Yelich, G., & Gallagher, M. (1990). Classroom, remedial, and resource teachers' views of pullout programs. *The Elementary School Journal, 90*(5), 533-545.

Middleton, E. L., Schuchard, J., & Rawson, K. A. (2020). A review of the application of distributed practice principles to naming treatment in aphasia. *Topics in Language Disorders, 40*(1), 36-53. doi:10.1097/TLD.0000000000000202

Miller, C., & Oh, K. (2013). The effects of professional development on co-teaching for special and general education teachers and students. *Journal of Special Education Apprenticeship, 2*(1).

Mount, M. (2014). Facilitating cohesive service delivery through collaboration. *SIG 16 Perspectives on School-Based Issues, 15*(1), 15-25. doi:10.1044/sbi15.1.15

Mullen R, & Schooling T. (2010). The national outcomes measurement system for pediatric speech-language pathology. *Language, Speech & Hearing Services in Schools, 41*(1), 44–60. https://doi-org.ezproxy.uky.edu/0161-1461(2009/08-0050)

NICHHD. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction (Report of the National Reading Panel, NIH Publication No. 00-4769)*. Washington, DC: U.S. Government Printing Office.

Nippold, M. A. (2012). Different service delivery models for different communication disorders. *Language, Speech & Hearing Services in Schools, 43*(2), 117–120.

Nochajski, S. M. (2001). Collaboration between team members in inclusive educational settings. *Occupational Therapy in Health Care, 15*(3/4), 101-112.

Pershey, M. G., & Rapking, C. I. (2003). A survey of collaborative speech-language service delivery under large caseload conditions in an urban school district in the United States. *Journal of Speech-Language Pathology & Audiology, 27*(4), 211-220.

Pfeiffer, D. L., Pavelko, S. L., Hahs-Vaughn, D. L., & Dudding, C. C. (2019). A national survey of speech-language pathologists' engagement in interprofessional collaborative practice in schools: Identifying predictive factors and barriers to implementation. *Language, Speech & Hearing Services in Schools, 50*(4), 639-655. doi:10.1044/2019_LSHSS-18-0100

Pfeiffer, D. L., Pavelko, S. L., Ingram, S. B., & Pearson. (2018). *Interprofessional education for preprofessional speech-language pathologists and general-education teachers. EBP Briefs. Volume 13, Issue 1*. Retrieved from http://ezproxy.uky.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=ED586943&site=ehost-live&scope=site

Rea, P. J., & Connell, J. (2005). Minding the fine points of co-teaching. *Education Digest: Essential Readings Condensed for Quick Review, 71*(1), 29-35.

Reblin, P. A. (1994). *A first-grade inclusion model that trains classroom teachers to modify and develop curriculum for language-learning disabled students.* Retrieved from http://ezproxy.uky.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=ED374605&site=ehost-live&scope=site Available from EBSCOhost eric database.

Riches, N. G., Tomasello, M., & Conti-Ramsden, G. (2005). Verb learning in children With SLI: frequency and spacing effects. *Journal of Speech, Language & Hearing Research, 48*(6), 1397-1411.

Ritzman, M. J., & Sanger, D. (2007). Principals' opinions on the role of speech-language pathologists serving students with communication disorders involved in violence. *Language, Speech & Hearing Services in Schools, 38*(4), 365-377.

Ritzman, M. J., Sanger, D., & Coufal, K. L. (2006). A case study of a collaborative speech--language pathologist. *Communication Disorders Quarterly, 27*(4), 221-251.

Schmitt, M. B. (2015). *Active ingredients of speech-language therapy in the public schools for children with language impairment.* (76), ProQuest Information &

Learning, Retrieved from http://ezproxy.uky.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2015-99220-431&site=ehost-live&scope=site Available from EBSCOhost psyh database.

Shanahan, T., & North Central Regional Educational Lab, N. I. L. (2005). *The national reading panel report. Practical advice for teachers*. Retrieved from http://ezproxy.uky.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=ED489535&site=ehost-live&scope=site

Silliman, E. R., Ford, C. S., Beasman, J., & Evans, D. (1999). An inclusion model for children with language learning disabilities: building classroom partnerships. *Topics in Language Disorders, 19*(3), 1-98.

Sobel, H. S., Cepeda, N. J., & Kapler, I. V. (2011). Spacing effects in real-world classroom vocabulary learning. *Applied Cognitive Psychology, 25*(5), 763-767. doi:10.1002/acp.1747

Squires, K., Gillam, S., & Ray Reutzel, D. (2013). Characteristics of children who struggle with reading: Teachers and speech-language pathologists collaborate to xupport young learners. *Early Childhood Education Journal, 41*(6), 401-411. doi:10.1007/s10643-013-0577-6

Stahl, K. A. D. (2016). A New Priority: Comprehension intervention in the primary grades. *The Reading Teacher, 69*(6), 627–631. https://doi-org.ezproxy.uky.edu/10.1002/trtr.1454

Storkel, H. L., Komesidou, R., Pezold, M. J., Pitt, A. R., Fleming, K. K., & Romine, R. S. (2019). The impact of dose and dose frequency on word learning by kindergarten children with developmental language disorder during interactive book reading. *Language, Speech, and Hearing Services in Schools, 50*(4), 518–539.

Suleman, S., McFarlane, L.-A., Pollock, K., Schneider, P., Leroy, C., & Skoczylas, M. (2014). Collaboration: More than 'Working Together' An exploratory study to determine effect of interprofessional education on awareness and application of models of specialized service delivery by student speech-language pathologists and teachers. *Canadian Journal of Speech-Language Pathology & Audiology, 37*(4), 298-307 210p.

Throneburg, R. N., Calvert, L. K., Sturm, J. J., Paramboukas, A. A., & Paul, P. J. (2000). A comparison of service delivery models: effects on curricular vocabulary skills in the school setting. *American Journal of Speech-Language Pathology, 9*(1), 10-20 11p.

U.S. Department of Education. (2019). National assessment of educational progress (NAEP), various years, 1992-2019 Reading Assessments. Retrieved from https://www.nationsreportcard.gov/highlights/reading/2019/

Ukrainetz, T. A., Ross, C. L., & Harm, H. M. (2009). An investigation of treatment scheduling for phonemic awareness with kindergartners who are at risk for reading difficulties. *Language, Speech & Hearing Services in Schools, 40*(1), 86-100. doi:0161-1461(2008/07-0077)

Ullman, E. (2010). Elevating Special Education. *District Administration, 46*(9), 32-32.

Ward, E. C. (2019). Elizabeth Usher memorial lecture: Expanding scope of practice - inspiring practice change and raising new considerations. *International Journal of*

Speech-Language Pathology, *21*(3), 228-239. doi:10.1080/17549507.2019.1572224

Warren, S. F., Fey, M. E., & Yoder, P. J. (2007). Differential treatment intensity research: A missing link to creating optimally effective communication interventions. *Mental Retardation & Developmental Disabilities Research Reviews, 13*(1), 70–77. https://doi-org.ezproxy.uky.edu/10.1002/mrdd.20139

Wei, X., Blackorby, J., & Schiller, E. (2011). Growth in reading achievement of students with disabilities, Ages 7 to 17. *Exceptional Children, 78*(1), 89–106.

Wilcox, M. J., Kouri, T. A., & Caswell, S. B. (1991). Early language intervention: A comparison of classroom and individual treatment. *American Journal of Speech-Language Pathology, 1*(1), 49-62. doi:10.1044/1058-0360.0101.49

Will, M. C. (1986). Educating students with learning problems: A shared responsibility / by Madeleine Will. In: Washington, D.C: Office of Special Education and Rehabilitative Services, U.S. Dept. of Education, 1986.

Wilson, L., McNeill, B., & Gillon, G. T. (2015). The knowledge and perceptions of prospective teachers and speech language therapists in collaborative language and literacy instruction. *Child Language Teaching & Therapy, 31*(3), 347-362. doi:10.1177/0265659015585374

VITA

Laura T. Glastetter-Stone

1. Educational Institutions and Degrees Awarded

University of Kentucky	May 2020 (Expected)	Rehabilitation Sciences PhD
Murray State University	May 1994	Communication Disorders M.S.
Murray State University	May 1992	Communication Disorders B.S.

2. Professional Positions Held

Murray State University	2020 (Fall)	Adjunct Professor
Eastern Kentucky University	2019	Adjunct Professor
Scott County Schools	2005 – Present	Speech Pathologist
Signature Health Care	2005-2006	Speech Pathologist
Professional Rehab Associates	1998-2005	Speech Pathologist
Vencor, Inc. Skilled Nursing Facilities	1996-1998	Speech Pathologist
Gardner-Manzella, Inc. St. Charles, MO	1995-1996	Speech Pathologist
Cimarron Health Care, Inc. St. Louis, MO	1994-1995	CF SLP

3. Scholastic and Professional Honors

Kentucky Speech Language Hearing Association	VP of Schools Elect
American Speech Language Hearing Association	Invited Presentation
2019 Grant Awarded – ADK Upsilon Chapter Mini Grant	$1000
2008 Grant Awarded – Teach Lead and Inspire Grant	$800

4. Professional Publications

Lowman, J., Stone, L. Guo, J. (2018). Effects of Interactive Book Reading for Increasing Children's Knowledge of Instructional Verbs. *Communication Disorders Quarterly*

Glastetter-Stone, L (2018) Service Delivery Models for School Based SLPs, Push-In vs. Collaboration. *The Informed SLP*. http://www.theinformedslp.com/qa_push_in.html